ANALYSIS THE IMPACT OF GDP, INFLATION AND EXCHANGE RATE ON FDI IN INDONESIA

THESIS

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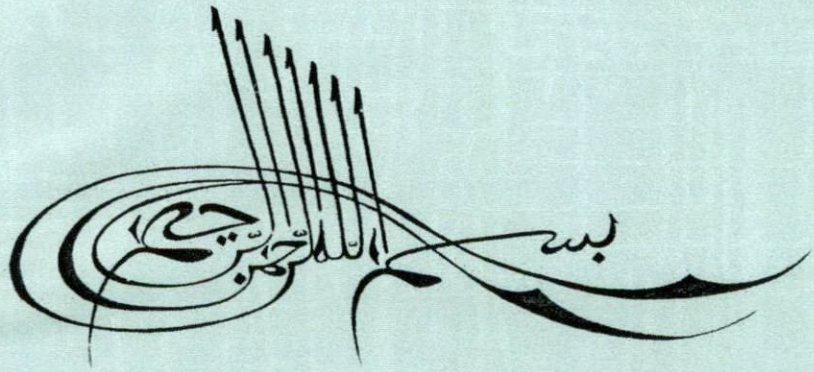

I dedicated this thesis to

My beloved parents

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Analysis the impact of GDP, Inflation and Exchange rate on FDI in Indonesia

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ABSTRACT

This study analyze the impact of GDP, Inflation and exchange rate on FDI in Indonesia by using annual time series data from 1970-2013. All the variables considered were integrated at first order, as result the co-integration approach was used and the result showed that the variables were co-integrated. Therefore, Structural Vector Autoregression (SVAR) was estimated. The granger causality test shows that there is a unidirectional relationship between FDI to GDP. The highest influence to FDI based on variance decomposition is influenced by GDP. The finding in this research suggest that to stabilize economic condition to increase GDP in Indonesia

Keywords: FDI, GDP, Inflation, Exchange rate, SVAR

This thesis has been presented before the examiners in the Thesis Examination and successfully passed the Thesis Examination on July 6th, 2015.

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I would like to state that my thesis with title "**Analysis the impact of GDP, Inflation and Exchange rate on FDI in Indonesia**" is worked by myself and there is no part or all of the posts that contain the phrase, idea, or opinion from another source without giving acknowledgment to the original author. As the parts are sourced from other people's work have included the source in accordance with the norms, ethics and rules of scientific writing. If they find a plagiarism in this thesis, I am willing to accept the sanction of revocation of academic degrees that I have gained.

Padang, July 2015

The giver of statement

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PREFACE

All praise to be on Allah SWT, Lord of the world. The writer would like thank to God for its guidance and mercy therefore my thesis **"Analysis the impact of GDP, Inflation and Exchange rate on FDI in Indonesia"** has finally been accomplished on time without matter problem. This thesis is submitted as a patial requirement to acquire Bachelor Degree at Economic Department of Economic Faculty of Andalas University.

The writer realize that this thesis still far from perfection. It needs to be improved. For that reason, the writer would gladly welcome constructive critics and suggestions for perfection. Hopefully this thesis can be helpful and give benefit to anyone who read it, especially to academicians and students. In the process of completion, there are many people who have involved either directly or indirectly. I would like to express my gratitude to those people who made it possible for me to complete this thesis. With all of the humility, my infinitely gratitude I express to:

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Padang, July 2015

Rahmat Hidayat

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CHAPTER I

INTRODUCTION

1.1. Background

Indonesia is a large and developing country in Southeast Asia, therefore, will be an attraction for FDI in Indonesia, and right now Indonesia is trying to speeds up the development. The ability of government to provide capital for the purpose of speeding up development is limited. Therefore, as one aspect of the government policy had to make efforts in order to obtain more funds for development. Capital deployment efforts for that purpose can be distinguished in the deployment of capital in the country which is a part of the wealth of society Indonesia, including right and good either State-owned or private, national or foreign private company based in Indonesia for the devoted to the development of the national economy has been established in law Number 6 Year 1968 about Domestic Investment. Whereas in the framework of the utilization of foreign investment for the development of the national economy devoted has been established in law Number 1 Year 1967 about foreign investment (Lubis, Afifuddin, Kasyful, 2008)

According to Sri Adiningsih (1998), that the depreciation of the rupiah exchange rate, against foreign currencies, especially the US dollar has a negative influence on the economic condition of the overall, including capital markets, as well as rising interest rate will reduce the financiers to invest in the capital market.

Thus, the weakening of the rupiah exchange rate will significantly affect to the return on FDI of an enterprise, especially companies that rely solely on raw

materials from abroad, and it will also override the companies that rely solely on foreign loans in the form of US dollars to finance the operations of the company.

Fluctuation in the value of the rupiah against foreign currencies will greatly affect the stable FDI climate in the country, particularly the capital markets. The appreciation of the rupiah exchange rate against the dollar, for example, will give the impacts on the development of its marketing Indonesia abroad, especially in terms of price competition. When this happen, indirectly will give effect on the trade balance, due to the decrease in export value compared to the value of imports, and then it will affect the balance of payment Indonesia. And the worsening of the balance of payment will certainly have an effect on foreign exchange. Reduce foreign exchange reserves will reduce investor confidence against Indonesian economy, which was causing negative impact on stock trading in the stock market resulting in capital outflow.

Monge and Naranjo (2002) argued that NAFTA gave significant advantage inflow of FDI that countries member of NAFTA comparing with another country. The impact of regional integration on FDI reinforce studied by Waldkirch (2008), FDI in Mexico has increased dramatically since the inception of the NAFTA. Soo Lee and Hyup Shin (2009), economic gains from the EU enlargement are expanded in member countries when liberalization in the services sector is considered.

According to Lean (2008), there is no evidence of causation running from the increase in FDI to GDP growth or vice versa in both the short and long run, implying that the relationship between FDI and growth of the Malaysian manufacturing sector is independent, this is finding rather interesting because it

contradicts with most theoretical expectations of FDI driven growth. Har Wai Mun (2008) found a significant relationship between economic growth and FDI inflows in Malaysia.

In Singapore, there is no evidence that the causality link between FDI and GDP, results further suggest that Singapore's capacity, including but not limited to free trade zones, trade regime, tax incentives, infrastructure quality, the human capital base and the transfer of technology, to progress in economic development will depend on the country's performance in attracting foreign capital (Feridun & Sissoko, 2011).

Because of the descriptions above, the author is interested in studying and analyzing further that affect of gross domestic product, inflation and exchange rate against FDI in Indonesia with the title **" Analysis the Impact of GDP, Inflation and Exchange rate on FDI in Indonesia".**

1.2. Research Problem

Based on the background described above, in this study the formulation of the problem posed is:

1. What are the gross domestic product (GDP), inflation and exchange rate affect to foreign direct investment in Indonesia.
2. Which among the gross domestic product, inflation and exchange rate the most dominant influence on FDI in Indonesia?

1.3. Research Objectives

1. To analyze the influence of gross domestic product, inflation and exchange rate on FDI in Indonesia.
2. To analyze the most dominant factor that influences on FDI in Indonesia.

1.4. Research Advantages

1. For researcher, the result of this study is expected to improve knowledge about the influences GDP, inflation and exchange rate onFDI in Indonesia.
2. For students, as input and information for further research related to issues of FDI in Indonesia.
3. For university, research is expected to be beneficial, particularly of the economic faculty of the economics department in order to complete the repertory in Andalas University libraries.

1.5. Systematic Writing

In writing this research, it is grouped into six chapters, which are details as the following:

Chapter I : *Introduction*

An introductory chapter provides background on issues concerning the selection of research title, problem question, research objectives, research advantages, and writing systematic.

Chapter II : *Theoritical Framework and Literature Reviews*

Contains the theoretical basis of the theories that are the basis for analysis of the issues to be addressed in this study. While literature review contains the results of studies that have been performed for comparison and consideration in this study.

Chapter III : *Research Methodology*

This chapter provides data, methodology, and other supporting concept used to test and examines the variables.

Chapter IV : *An Overview Of Indonesia Economy*

This chapter description about Foreign Direct Investment (FDI), Gross Domestic Product (GDP), exchange rate

and inflation that all of that related to Indonesia condition.

Chapter V : *Empirical Results and Analysis*

In this chapter will explain the research result and their implications. Research result of a study on the influence of variable, GDP, inflation and exchange rate on FDI in Indonesia over period 1970-2013.

Chapter VI : *Conclusion and Recommendation*

In this chapter consists of a conclusion and recommendation to take policy and improved government.

CHAPTER II

THEORETICAL FRAMEWORK AND LITERATURE REVIEWS

2.1. Theoretical Framework

2.1.1. Foreign Direct Investment Theory

Foreign direct investment (FDI) is an international capital flows out of a country where the company is set up or expand his company into other countries (Krugman, 2004). Therefore, not only the transfer of resources, but also the implementation of the control of the company abroad.

Panayatou (1998) explain that FDI is more important in guaranteeing the continuity of development compared with the flow of aid or capital portfolio, the cause of FDI in a country will be followed by transfer of technology, know-how, management skils, business risk is relatively small and more profitable.

Approach "OLI Framework" proposed by Dunning (1981) developed an approach by combining three main theories of FDI, they are, organization industrial theory, location theory and internalization theory. There are three conditions that must be met if a company did foreign investment, the first is the company must have some ownership advantages compared other companies. These conditions will make a product or a production process of other companies do not have access therein such as patents. Second, should be more advantages in combination with at least some of the inputs (factors) that are located abroad. And the last, should be more profitable to exploit these advantages rather that sell or lease to another company.

2.1.2. Gross Domestic Product Theory

GDP is the market value of all final goods and services produced within an economy in a given period of time (Mankiw, 2005). The concept of GDP was first developed by Simon Kuznets for a US Congress report in 1934. In this report, Kuznets warned against its use as a measure of welfare. After the Bretton Woods conference in 1944, GDP became the main tool for measuring a country's economy. At that time Gross National Product (GNP) was the preferred estimate, which differed from GDP in that it measured production by a country's citizens at home and abroad rather than its 'resident institutional units'. The switch to GDP was in the 1980s.

According to McEachern (2000:146), GDP means to measure the market value of final goods and services produced by the resources in a country during a given period of time. According to Immamul Arifin and Gina Hadi W (2009:11), GDP is indicators used to determine the economic growth of a country. Some reason to use GDP as measurement indicators of economic growth, the first, GDP calculated based on the total value added generated throughout the production activity in economic. Second, GDP basis of the circular flow concept, that is the calculation of GDP includes the value of produce products in a given period. And the last, limit of the GDP calculation region is domestic economy. It's possible to measure the extent to which economic policies implemented by the government and encourage domestic economy.

2.1.3. Inflation

2.1.3.1. Definition of Inflation

Inflation is the tendency of prices to rise in general and continuous. This doesn't mean that the prices of various goods rise by the same percentage, such increases may not occur simultaneously, which is important there is a general price increase of goods continuously for a certain period. The increase, which occurs only once, such as seasonal, before the big day, although with a fairly large percentage (do not have further effect) is not called inflation. Such price increases are not considered as an economic problem, and requires no special wisdom to mitigate them. (Boediono, 1998: 161)

According Nopirin (2000) inflation is a general rise in prices of goods on an ongoing during a given period. Price increases that occur only once despite the large percentage not constitute inflation. According to McEachern (2000), inflation is continual rise in the average price level. If the price level fluctuates, this month rise and next month down, each to an increase in employment does not mean as inflation.

2.1.3.2. Types of Inflation

Inflation can be dividen into several groups, mild inflation (<10% a year), moderate inflation (between 10%- 30%), weight inflation (> 100% a year).

According to Nopirin (2000), inflation classified into three catagories, they are:

a) Creeping Inflation

Creeping inflation is characterized by low inflation rate, less than 10% a year. price increase slowly, with a small percentage as well as the relatively long term.

b) Galloping Inflation

Galloping inflation characterized by considerable price rise and are sometimes run a short time and have the relative acceleration.

c) Hyperinflation

Inflation is the most severe consequences. Prices rise to 5 or 6 times. People no longer wishes to save money. The value of money declined sharply so wanted exchanged for goods. Accelerating the velocity of money, the price rise acceleration.

Nopirin (2000) classified according to the type of inflation as follows:

a) Demand-pull inflation

This inflation stems from the increase in aggregate demand, while production has been in a state of full employment. In a state of almost full employment, increase total demand in addition to raising prices can also raise the production (output).

b) Cost-push inflation

Cost push inflation is marked by the rise in prices and decline in production. This situation arises usually begins with a decrease in aggregate supply as a result of the increase in production costs. The increase in production costs, in turn, will raise prices and declining production. If this process goes on there arises a cost push inflation.

2.1.4 Exchange Rate Theory

The exchange rate is the price of a currency against other currencies, or the value of a currency against another currency value (Salvatore 1997: 9). The increase in the exchange rate of the domestic currency is called appreciation for foreign currency. The decline in the exchange rate in the country is called depreciation of foreign currency. According to Paul R Krugman and Maurience (2004: 73) exchange rate is the price of a Currency of a country that is measured or expressed in other currencies.

According Nopirin (2000: 163) Currency exchange is between two different Exchange, it will get a comparison of the value / price between the two such Currency. Dornbusch and Fisher (1980) say that exchange rate movements affect international competitiveness and trade balance position, and consequently will also impact on real output of the country which in turn will affect the cash flow today and the future of the company. Equity, which is part of the company's assets, can affect the behavior of the exchange rate mechanism based on the model of money demand determination of the exchange rate by monetary experts.

1.1. Literature Review

Udyog Bhavan (2004), "Opportunities and Policy Challenges for investment in India". This paper attempts to provide a balanced account of the many developments that are going on in India's infrastructure sectors. The phase of economic reforms, which began in 1991, put enormous emphasis on infrastructure development, based on the recognition that the twin objectives of growth and social welfare. Realizing that severe fiscal constraints would

necessarily limit the role of the government as a builder and maintainer of infrastructure facilities, the policy thrust was to facilitate the entry of private investment into these sectors. Private of course was not limited to domestic foreign investment was seen as an essential means of enhancing the resources flows to these funds-starved sectors. Change in policy or regulatory structures, when it has happened, has been basically motivated by the perception that business as usual was not going to get the system any closer to the objectives. The investment opportunity, never in doubt as far as the potential itself was concerned, has now been made even more attractive by the force of convergence. The government recognizes the need for private and foreign investment in infrastructure, welcomes it and stands ready to facilitate it in any way the process promotes the interest of all the stakeholders in the process.

Alhasymi (2010), "The effect of inflation, real interest rate and exchange rate against foreign direct investment in Indonesia". This study aimed to analyze the influence of inflation, interest rate and exchange rate against foreign direct investment in Indonesia during the period 1985-2010. Data were analyzed using multiple regression method. The estimation results show that the coefficient of determination is 35,20%, it means, independent variables capable of explaining the dependent variable 35,20%, while the 64,80% is explained by other variables not included. Inflation and exchange rates have a negative effect on foreign investment, whereas the real interest rate has a positive effect on foreign direct investment.

Alexander Monge and Naranjo (2002), "The impact on foreign direct investment flows in Mexico and the excluded countries", this study examines the

effect of the North America Free Trade Agreement (NAFTA) on flows of foreign direct investment (FDI) received by Mexico and the countries in the region that were excluded from the treaty. To this end, the paper compares the benefits provided by NAFTA to Mexico with the trade benefits offered by the US to other countries as well as the incentives provided by host countries. There is a positive effect in the first two years, 1994 and 1995 in Latin America. Looking at the measure of FDI per capita, the effect seems larger on impact and decline over time. This would indicate that that during the first year Mexicans received a roughly different of US$19 in favor with respect to Central Americas and US$23 with respect to Latin Americans as a result of NAFTA. The differences fall to US$11. 4 in the following year. However, especially in the years 1994 and 1995, right after NAFTA and the Tequila crisis, thus, NAFTA and other shocks specific to Mexico may account for a small fraction of the variation of the FDI, not because the effects are small, but instead, because have occurred less frequently than other shocks.

And Andreas Waldkirch (2008), aims to analyze "the effect of foreign direct investment in Mexico since NAFTA", FDI in Mexico has increased dramatically since the inception of the NAFTA, the impact of FDI on industrial productivity and wages over the first ten years of NAFTA, paying particular attention to the source country and destination industry of investment.

Then, research by Lee and Shin (2009) estimates the economic impact of the EU enlargement on the EU regions such as the EU-15, the CEEC-10, and Bulgaria-Rumania. In addition, the paper estimates the impacts on the EU's major trading partners such as Korea, Japan, and the United States. The research result

found a huge inflow of FDI into CEEC-10 and a modest inflow in Bulgaria-Romania is verified empirically, FDI inflows into these regions, measured by equity holdings of the global trust in the regional financial assets, are estimated to have increased by 11.01 percent and 1.55 percent. And then, economic gain from the EU enlargement are expanded in member countries when liberalization in services is considered in addition to liberalization in goods. Estimated GDP growth from the good and services liberalization scenarios in the CEEC-10 is 41-59 percent higher than the estimates of the goods only liberalization scenarios. And GDP growth in Bulgaria and Romania is 14-28 percent higher than the goods only liberalization scenarios. Economic impacts of the EU enlargement on Korea, Japan, and the United States are minimal in terms of macroeconomic variable such as GDP and total export and import.

China's entry into the WTO and its impact on EU (Ki Hee Kim), China is one of the fastest growing economies in the world, has made tremendous progress in the last decade in reducing poverty and an economic system increasing openness to trade and foreign investment. WTO membership likely inclines China more toward peace and progress will take time. More importantly for the EU, joining WTO membership China will grant unprecedented access to the Chinese market for both EU export and investment. A half years after China's entry into the WTO. The EU is extremely confident that the Chinese government will play a very contructiverole in global trade. China had a trade surplus of US$9. 7 billion, with the EU in 2002 and the amount reached US$4. 3 billion in the first four months of in 2003.

Alan Bevan, Saul Estrin and Heather Grabbe analyze the impact of EU accession prospects on FDI inflows to central and eastern Europe, inflows of investment to central and eastern Europe (CEE) has increased sharply since 1994, when the European Union (EU) committed itself to enlarge. Having controlled for all the factors that encourage and discourage FDI, the results suggest that the 1994 Essen Council announcement was associated with a significant increase in the level of FDI received by the front-runner countries for EU accession. Moreover, the results indicated that the EU's decision in 1997 to open negotiations with five CEE applicant countries led to an increase in the growth rate of FDI to the leading applicants.

Kim (2004) researched free trade agreement at the regional level the changes seems to be much more significant, although NAFTA has not changed the aggregated volume very much. Moreover, NAFTA seems to change the trade pattern. For example, a Southern state in the U.S increased its trade with Canada quite substantially. However, the larger state level impact should be taken with cautions. First, the state level data more volatile and the econometric estimation based on these data may be less robust, leading to larger impact than the national level analysis. Second, FTA changes the production pattern within firms and industries, but these changes may show up as the changing trade pattern. Consequently, although the state level trade patterns may change a great deal, the production and employment effect may not be greater.

Lean (2008) in researched focused on the relationship between FDI and GDP in the manufacturing sector in Malaysia over period 1980-2005 using error correction method (ECM). The researcher found no evidence of causation running

from the increase in FDI to GDP growth or vice versa in both the short run and long run. Overall, the empirical results implying that the relationship between FDI and growth of the Malaysian manufacturing sector is independent, rather interesting because it contradicts with most theoretical expectations of FDI driven growth.

Then researched by Mun, Lin and Man (2008), used ordinary least square (OLS) regression and the empirical analysis conducted by using annual data on FDI and economic growth in Malaysia over the period 1970-2005, they found FDI has continued to play a significant role in the Malaysia's economy. There is a positive relationship between the FDI and economic growth, which the relationship is found to be significant. These findings have important policy implications where the government has to concern the importance of the FDI contributed to economic growth. Economic development of a country can achieve by encouraging more FDI, which it can help to create more employment in the country.

Tsen (2005) investigated the long-run relationship between FDI and itsit's location-related determinants in the manufacturing industry of Malaysia over the period 1980-2002. The researcher found that good education or infrastructure attracts FDI, on the other hand, an increase in inflation or exchange rate leads to a decrease in FDI.

1.2. Hypothesis

Based on the formulation of issue and empirical studies have been done before, the hypothesis to be tested in this study are:

1. There is positive effect GDP on FDI.
2. There are negative relationship between inflation, exchange rate to FDI.

CHAPTER III

REASEARCH METHODOLOGY

3.1. Types and Data Sources

The data used in this research is secondary data with quantitative data in numeric, which include: data or yearly foreign direct investment (FDI), GDP, inflation and exchange rate in Indonesia. The secondary data were obtained from official online sources in the period 1970 -2013. Then reference from reading the article, journal, economic books, etc.

3.2. Variables

3.2.1. Foreign Direct Investment (FDI)

Foreign direct investment is a controlling ownership in a business enterprise in one country by an entity based in another country. Foreign direct investment is distinguished from portfolio foreign investment, a passive investment in the securities of another country such as public stock and bonds, by the element of control. In this study the writer used FDI inflows, FDI inflows measure in percent (%) which the data is current prices in 2005 in U.S dollar. This data were obtained from World Development Indicators (WDI) in Excel File Form.

3.2.2. Gross Domestic Product (GDP)

The value of a country's overall output of goods and market prices, excluding net income from abroad. In this study GDP measure in percent (%) which the data is current prices in 2005 in U.S dollar. This data were obtained from World Development Indicators (WDI) in Excel File Form.

3.2.3. Inflation

Inflation is a sustained increase in the general price level of goods and services in an economy over a period of time. In this study inflation measure in percent (%) which the data is current prices in 2005 in U.S dollar. The data were obtained from World Development Indicators (WDI) in Excel File Form.

3.2.4. Exchange Rate

Exchange rate in finance is an agreement as the exchange rate of the current payment now or in the future, between two currencies of each country or region. The data were obtained from World Development Indicators in Excel File Form. The exchange rate is constant price 2005 per U.S dollars, period average.

3.3.Analysis of the Model

There are basically four variables that will be used for regression. These variables include Foreign Direct Investment inflows (FDI), Gross Domestic Product (GDP), Inflation and Exchange Rates.

3.3.1. Analyzing Method

To analyze foreign direct investment, gross domestic product, inflation and exchange rate variables with using Structural Vector Autocorrelation (SVAR) with using program Eviews 6.0. SVAR method has to follow this following step:

3.3.2. Stationary Test

A variable is said as stationary if the value of the average variance and covariance is always constant. The existence of stationary variables will increase the possibility of the existence co-integration relationships among variables, where the value of the result from coefficient will be invalid due to standard error bias. Therefore the unit root test needs to be done to test whether there is a unit root in the time series data or not. To find out, it uses stationery test using the Augmented Dickey Fuller (ADF) test or Phillips-Perron (PP) test.

3.3.3. Lag Optimal

Step to do in using the VAR model is to determine lag optimal that will be used in the model. Obtaining optimal lag can be done some testing by utilizing the information that obtained from Likelihood Ratio (LR), Final Prediction Error (FPE), Akaike Information Criterion (AIC), Schwarz Information Criterion (SIC), and Hannan Quinnon Criterion (HQ).

3.3.4. Co-Integration Test

Next step is to determine co-integration of the time series data. Co-Integration testing is extension of unit root test. If the data co-integrated for next estimation can't be used by VAR, so VECM must be used instead. To do co-integration test by doing Johansen's Co-integration Test. In this test, if trace statistic > critical value, it's indicated that co-integration among variables.

3.3.5. Granger Causality Test

This test is to show the relationship between variables. If a value of probability less than 0.05 and F-statistics obtained greater than the value of its probability, thus both variables statistically exist Granger causality relationship. If both variables exist in Granger Causality relationship, it is called as bidirectional relationship. But, if only one variable exist in Granger Causality relationship, it is called as a one-way relationship.

3.3.6. SVAR (Structural Vector Autoregression)

This research is using time series data and the methodology is SVAR (Structural Vector Autoregression). SVAR models are developed by using the common of VAR model and used to obtain ortogonalitation non-recursive error term in the framework of the impulse response analysis. To obtain ortogonalitation non-recursive error term, it must be formed by numbers of restrictions in to identify the structural components of the error term (Gottschalk, 2001).

For Example, y_t as endogen vector variable with element k and $\sum \varepsilon\mu =$ E $[e_i e_i']$ is residual covariance matrix. So SVAR model estimation is by this following formula:

$$Ae_i = B\mu_i \qquad (3.1)$$

Where, e_i and μ_i is vector with k observed residual and vector with k unobserved structural inovation. A and B is matrix k x k that is going to be estimated. The structural innovation μ_i is assumed as orthonomal so that the

matrix covariance is matrix identity E $[\mu_i \mu_i']$ = 1. By this assumption, the number of restriction needed are as much k(k + 1)/2 to done as $2k^2$ parameters that unknown on matrix A and B, so Matrix A is lower-triangular matrix and Matrix B is diagonal matrix.

$$A = \begin{bmatrix} 1 & 0 & 0 \\ a_{21} & 1 & 0 \\ a_{31} & a_{32} & 1 \end{bmatrix} \quad (3.2)$$

$$B = \begin{bmatrix} b_{11} & 0 & 0 \\ 0 & b_{22} & 0 \\ 0 & 0 & b_{33} \end{bmatrix} \quad (3.3)$$

In this research, SVAR method is used to analyze the impacts of changes GDP, inflation, exchange rate toward FDI. The reasons to use SVAR are based on the primacy of SVAR , such as:

1. SVAR only needs a few restriction to evaluate the changing of variable endogen into part that reference to underlying shock.
2. SVAR is a tools to analyze the effect of shock and the role in some period, by using impulse response function and variance decomposition.
3. SVAR is easy to do an estimation.

SVAR model in this research uses for variables. They are GDP, inflation, exchange rate and FDI. By four variables so SVAR model that can be denoted as follows:

$$A_0 X_t = A(L) X_{t-1} + B\varepsilon_t \quad (3.4)$$

Where:

A_0 = contemporenous relationship among variables

X_t = vector with three variables that used

$A(L)$ = finite order matrix polynomial wit lag L operation

t = vector structural disturbances

B = matrix with no zero diagonal

When the formula transformated, so SVAR model in this research can be formulated by this following matrix:

$$\begin{bmatrix} GDP \\ INFL \\ EXCHRATE \\ FDI \end{bmatrix} = \begin{bmatrix} 1 & 0 & 0 & 0 \\ a_{2.1} & 1 & 0 & 0 \\ a_{3.1} & a_{3.2} & 1 & 0 \\ a_{4.1} & a_{4.2} & a_{4.3} & 1 \end{bmatrix} \begin{bmatrix} U_{GDP} \\ U_{INFL} \\ U_{EXCHRATE} \\ U_{FDI} \end{bmatrix} \quad (3.5)$$

I II III

The Part of matrix I is structural disturbance, they are GDP, inflation, exchange rate and FDI. The Part of matrix II is residual shock from each variables. The part of matrix III is the relationship among variable. From the formula above, SVAR model in a simple way can be shown by this following formula:

@e1 = C(1)*@u1
@e2 = C(2)*@e1 + C(3)*@u2
@e3 = C(4)*@e1 + C(5)*@e2 + C(6)*@u3
@e4 = C(7)*@e1 + C(8)*@e2 + C(9)*@e3 + C(10)*@u4

3.3.7. Stability Test

The method used to analyze this research is by using impulse response analysis and variance decomposition analysis. But, before that the VAR estimation is arranged, it is stability must be tested stability first. If VAR is unstable, so the result of impulse response analysis and variance decomposition analysis are invalid.

The VAR stability test is performed by using the calculation of the roots from polynomial function or called as restriction of the characteristic polynomial, by following this formula:

$$Det\ (I - A_Z Z^1 - A_2 Z^2 - A_3 Z^3 - \ldots - A_p p)$$

Where I is matrix identity M x M dimension. If all the position of the polynomial roots located in circle unit or the modulus value less than one, so VAR (p) model is stable so that the impulse response function and variance decomposition analysis result is valid.

3.3.8. Impulse Response Function (IRF)

The IRF is the method used to determine the response of endogenous variables to another variable shock. Because the shock of variables not only influences to the variable itself, but also influences for all endogen variables through dynamic structure or lag structure in VAR. So, the IRF is to measure the effect of a shock at any given time to the innovation of the endogenous variables at the time and in the foreseeable future (Pyndick and Rubinfeld, 1998) in Ayadi (2014).

In the simplest model, the IRF can be illustrated by following this formula:

$$y_{1t} = a_{11}y_{1t-1} + a_{11}y_{2t-1} + \varepsilon_{1t}$$

$$y_{2t} = a_{21}y_{1t-1} + a_{22}y_{2t-1} + \varepsilon_{2t}$$

At the t period, shock at 1t has direct effect and one for one to y_{It}but hasn't effect influence to y_{2t} At t +1 periods, shock at y_{It} will influence to y_{I}, t + 1 and y_{2}. The effect from shock 1t works at t + 2, then t +3 and so on.

3.3.9. Forecasting Error Variance Decomposition (FEVD)

Variance decomposition is separating variation in endogenous variables into several components shock in the VAR, variance decomposition describes the long-term relationship between the variables that have causality relationship. The strangeness and the weak relationship between variables are determined by the size of the coefficient in each variable. The larger coefficient, it means that the stronger relationship of these variables with the objective variables.

3.3.10. Correlation Matrix

The correlation Matrix test is used to explain strong or weak correlations between variables and to see that variables have stayed in the right structure. Correlation matrix can be received if the residual correlation between variables is more than 50% of the value and less than 0.2.

CHAPTER IV

AN OVERVIEW OF INDONESIAN ECONOMY

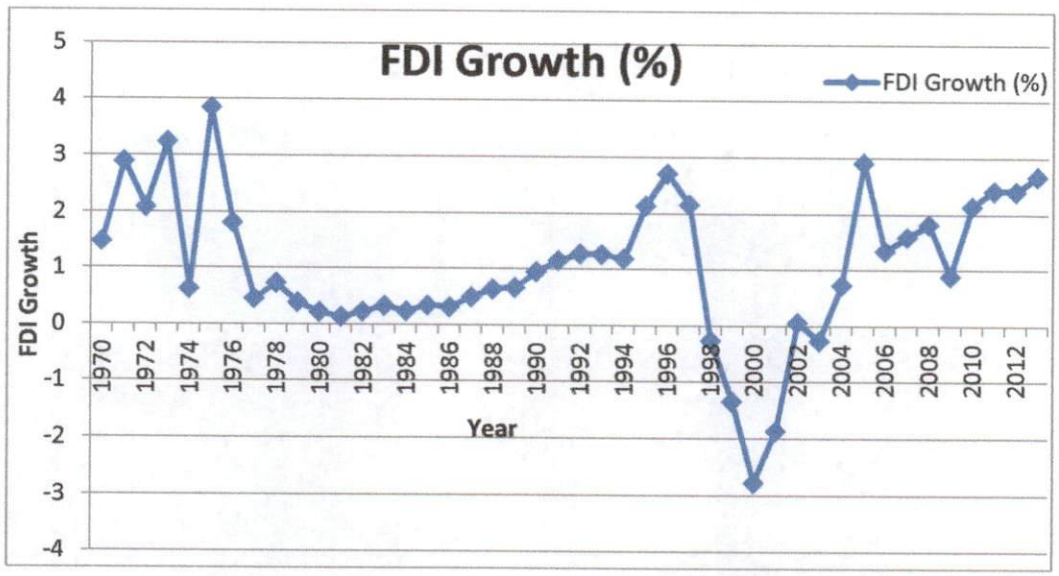
4.1. Indonesian Foreign Direct Investment (FDI)

The characteristic of developing countries is a lack of capital or low levels of saving and investment. Not only a very small stock of capital, but also a very low saving rate. Average gross investment only 5% - 6% of the gross domestic bruto. Whereas developed countries range from 15% - 20%. The rate of saving is low it was not enough to rapid population growth (Jhingan, 2000).

Investment is expected to increase economic growth and expanding employment. In an effort to create a conducive investment, the government publishes the deregulation policy, debirocratization and decentralization in investment. Deregulation in real sector in investment realized by the issuance of government regulation No.20/1994 which allows each investor owns 95% of stock in its business in Indonesia (Indonesian economic report, 2000).

FDI is a key element in international economic integration. FDI creates direct, stable and long-lasting links between economies. Governments pay attention to FDI for investment inflows and outflows of the country, they could have a significant impact. Economist considers as one drives of economic growth to national economic measure such as GDP. They also argue that FDI promotes development because the host country or company receives the investment. The FDI inflows growth in Indonesia since 1970-2013 is depicted in graph 4.1.

Graph 4.1 FDI, net inflows (%) in Indonesia 1970-2013



Source: World Development Indicators

Based on graph 4.1, FDI inflows in Indonesia is not stable because are fluctuating between 1970-1976, increase from 1.48 percent in 1970 become 2.90 percent in 1971 and then decrease in 1972 but not much, become 2.10 percent, and increase become 3.25 percent in 1973 and then falling down at 0.65 percent in 1974 and 1975 FDI inflows growth in Indonesia reached at a level 3.86 percent. This was the highest level in FDI inflows occurred.

In 1977 until 1995 FDI inflows in Indonesia relatively stable, in 1977 until 1990 moving at a zero point level, then in 1991 until 1994 moving at one point level and increase at 2.15 percent in 1995. In 1996 FDI inflows in Indonesia was 2.73 percent, increase 0.58 percent.

When the crisis in 1997 and 1998 FDI flows into Indonesia fluctuated again from 2.17 percent in 1997 decrease drastically become -0.25 percent in 1998. In 1999, FDI tried to recover after crisis, the government tried to build

investors trust to invest. But the value of FDI at the time still decreased, at -1.33 percent. And the next two years, FDI flows in Indonesia has declined, become -2.76 percent in 2000 with the number of project 1521, this was the lowest level FDI inflows in Indonesia.

In 2001 until 2005, FDI inflows in Indonesia still fluctuated, in 2001 the level of FDI inflows in Indonesia at -1.86 percent increase in 2002 become 0.08 percent, in 2003 the level of FDI inflows in Indonesia decrease at -0.26 percent. But in 2004, FDI inflows in Indonesia increase become 0.73 percent and increase again in next year become 2.92 percent in 2005.

From 2006 to 2008, FDI inflows in Indonesia are moving relatively stable, 1.35 percent in 2006, an increase in 2007 become 2.61 percent and increase again in 2008 become 1.83 percent. In 2009, FDI inflows in Indonesia falling down, but not much, at the level 0.90 percent, and in 2010 until 2013 FDI inflows in Indonesia moving positively, FDI inflows always increase in the level 2.16 percent in 2010, and then increase in 2011 become 2.43 percent, and then always increase in 2012 at the level 2.42 percent and 2.69 percent in 2013.

4.2. Gross Domestic Product (GDP)

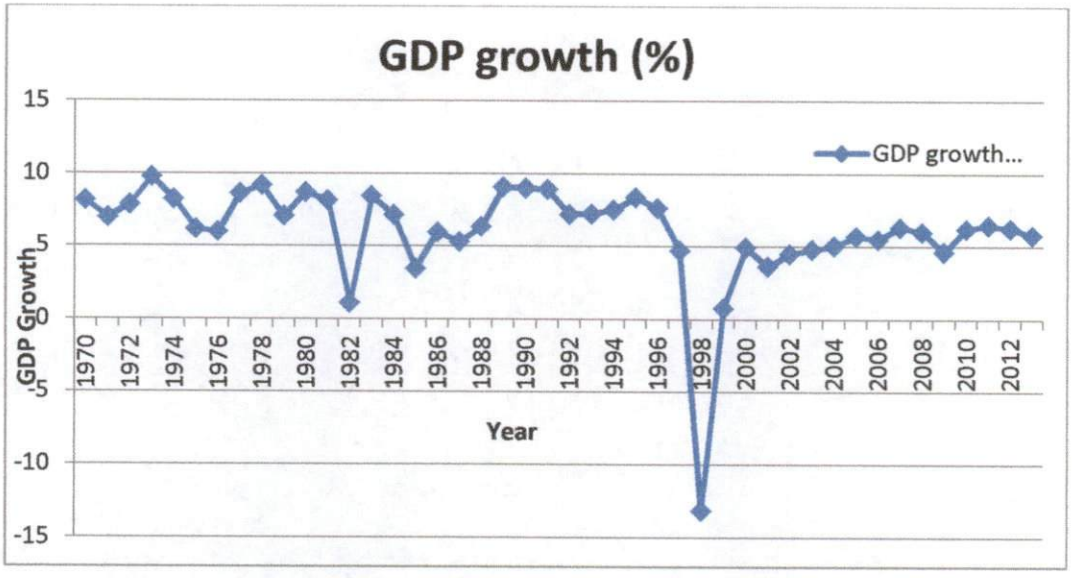
Economic growth is one important indicator in measuring the success of economic development policies of a country. Economic growth has signify one of development indicators in the national economy. One of Indonesian economic development indicators is the increase of GDP. If positive economic growth occurs, this matter indicates the increase growth of the economy compared last

year. Conversely, if the show negative, it indicates a decline of the economy compared to previous years.

During the period 1966-1982, which is the first half of the power of "new era", under the leadership of President Soeharto, there have been many developments and economic thinking rapidly. In the past, seen two kinds of opposite economic thought. The first of thought is a group that encourages greater role of the State on behalf of the welfare of the people and is reflected by the various allocations of funds for rural development programs and development of the social form of education and health. The second group is a group that supports the liberalization of the economy with open capital flows and the market the widest possible so as to encourage rapid economic growth in the framework of national macroeconomic recovery.

GDP in Indonesia that is shown by graph 4.2 that over the period 1970-2013, during 1970 until 1981 fluctuated GDP growth Indonesia relatively stable, even though GDP growth Indonesia fluctuated but that changed not significantly. In 1970 GDP growth in Indonesia at 8.15 percent and decrease next year at level 6.70 percent in 1971.

Graph 4.2 Gross Domestic Product (GDP) Indonesia 1970-2013



Source: World Development Indicators

In 1972 the GDP growth, increase become 7.89 percent and then increase at the level 9.78 percent in 1973, this was the highest level of GDP growth occurred. But in next three years GDP growth in Indonesia decrease, but not significantly, in 1974 GDP growth Indonesia at 8.26 percent and then decrease at 6.19 percent in 1975 and then falling down at a level 5.99 percent in 1976. In 1977 until 1981 changed in GDP Indonesia relatively stable, even though fluctuated but not significant, GDP growth still higher at the level more than 5 percent.

Economic condition Indonesia in 1980s in serious condition, mainly caused externalities factors like declining crude oil prices in international market, because during "new era", Indonesia embrace the open economic system, external shock like that the impact exquisite on economic growth, in 1982 GDP growth Indonesia falling down at the level 1.10 percent.

In 1983 the GDP growth Indonesia increase positively, in 1983 GDP growth Indonesia at the level 8.45 percent and the decrease in the next year, in 7.17 percent in 1984 and then decrease again in 1985 at level 3.48 percent. In 1986 until 1996 GDP growth Indonesia moves relatively positively, even though there are up and down, but not significant, GDP growth still higher than five percent.

In 1997 Indonesia enters financial crisis, GDP growth Indonesia decreases become 4.70 percent, these decreases caused by suffering the East ASEAN Financial Crisis. The crisis that began from the high depreciation of Thailand's currency (Baht) to USD which contaminated Indonesia and some other East Asian countries. In 1998 the GDP growth in Indonesia has decreased drastically become -13.13 percent, but in the next year Indonesia has improved economic growth, GDP growth Indonesia in 1999 is 0.79 percent. Even though the Indonesian economic recovery is relatively slower compared to other Asian country are experiencing similar economic crisis.

However, 1999 the government of Indonesia through new cabinet began to restructure the joints to be stable and the economy better. Achieving a high level of economic growth is also supported by the use of debt funding and outward oriented economic policy (Indonesian economic report, 1998).

Entering the year 2000, the Indonesian economy was characterized by optimism that is high enough, during 2000 the Indonesia economy showed a strong economic recovery with a pattern more balance economic growth, the mark with the increases of rupiah, declining inflation and interest rate on the real sector.

Economic growth in Indonesia in 2000 amounted to 4.9 percent by value of GDP (Indonesian economic report, 2000). But in 2001 GDP growth Indonesia decrease again at the level 3.64 percent.

In the period from 2002 economic growth continues to increase along with improvement in macro-monetary indicators such as exchange rate, inflation and interest rate then the economy in general is still identifying the process of economic recovery. GDP growth Indonesia in 2002 only 4.50 percent (Indonesian economic report, 2002).

In 2003 the GDP growth Indonesia increase of 4.78 percent and even in 2004 and 2005 getting up from 5.03 percent to 5.69 percent. The increase was due to the Indonesian economy grew by improving the pattern expansion, marked by the difficulty of total consumption, which has been dominant and the increase in domestic economic activity and economic growth (Indonesian economic report, 2005).

Indonesian economic growth in 2006 generally increase, the performance of GDP growth by 5.50 percent. The Indonesian economy in 2007 recorded an encouraging achievement despite pressure from the external side. For the first time since the crisis of economic growth above the rate of 6.35 percent. However, the Indonesian economy showed better resistance to support economic growth (Indonesian economic report, 2007).

Entering 2008, the Indonesian economy recorded a fairly good growth a maid global turmoil. Where economic growth reached 6.01 percent, support by private consumption and export (Indonesian economic report, 2008). However,

when entering in 2009, Indonesian economy decline due to the global economic contraction the peaked in the final quarter of 2008. Their condition resulted in monetary and financial system in the first quarter of 2009 were under heavy pressure, so that economic growth shows a downward trend. This is due to the effect of negative growth in exports and the slower growth impact of investment so that economic growth was the only growth at 4.62 percent (Indonesian economic report, 2009).

Furthermore, in 2010 the Indonesian economy improved where Indonesia's growth at 6.22 percent. This is supported by solid domestic demand, favorable external condition and an increase in exports and the role of non up investment, particularly investment in machinery. (Indonesian economic report, 2010). And in 2011 GDP growth Indonesia increase at a level 6.49 percent, and the next two years decrease at 6.26 percent in 2012 and 5.78 percent in 2013.

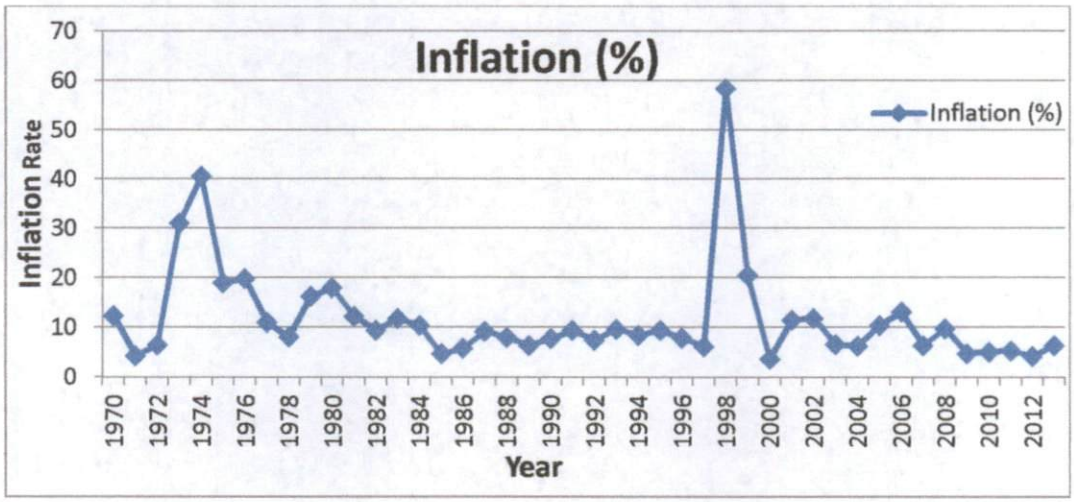
4.3. Inflation

In economics, inflation is a process of rising prices in general and continuity with regard to market mechanism that can be caused by various factors, among others, increased private consumption, excess liquidity in the market, which trigger consumption or even speculation, to include also due to the lack of launch distribution of goods. In other words, inflation is also a process of decline in currency values continues. Inflation is the process of an event, not a high-low level prices, that is the perceived high price level is not necessarily indicate inflation.

Inflation is an indicator to see the rate of change, and is considered to occur if the price increase takes place continuously and the interplay of influence. Inflation can be classified into four categories, namely floaty inflation, moderate, severe, and hyperinflation. Floaty inflation occurs when prices are below the 10 percent a year, moderate inflation between 10-30 percent a year, severe inflation between 30-100 percent a year, and hyperinflation or uncontrollable inflation occurs when above 100 percent a year.

Inflation in Indonesia that is shown by graph 4.3 that over the period 1970-2013, based on graph severe inflation occurred in two years, that is in 1973 and 1998, with 31.03 percent and 58.34 percent. In 1998 the exchange rate plummeted from 2.800 to 16.000 against the U.S dollar. Compounded by the turmoil occurring reform adds instability countries ended with the fall of Suharto from the presidency. It's the worst inflation that illustrated in the charts.

Graph 4.3 Inflations in Indonesia 1970-2013



Source: World Development Indicators

Indonesia experienced floaty inflation in 1971 with a 4.36 percent rate of inflation, in 1972 also with 6.51 percent. After a few years, floaty inflation happened again in 1978 with 8.11 percent, and 1982 too with 9.48 percent. In 1985 until 1997 inflation moving under 10 percent, even though at the time crisis, inflation jumped dramatically, but after that inflation Indonesia is moving stable in 2007 until 2013, inflation rate stable moving under 10 percent.

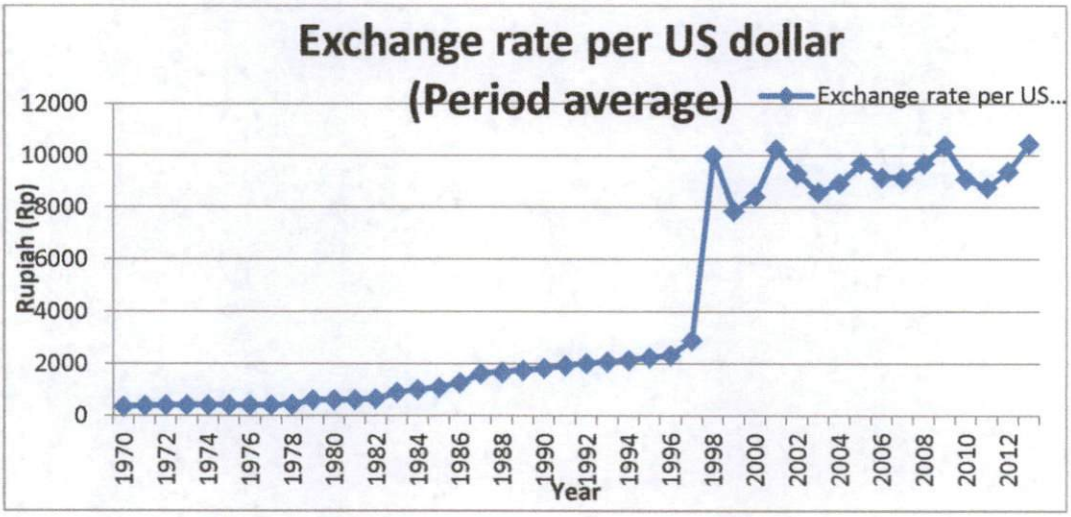
Indonesia experienced moderate inflation in 1970 with 12.35 percent, and then in 1975 and 1976 to 19.06 percent and 19.86 percent, in 1977 also with a 11.04 percent rate of inflation. In 1979 the inflation rate with 16.26 percent, and then increase become 18.11 percent in 1980, but decrease in 1981 with a 12.25 percent rate of inflation. And then after crisis moderate inflation happened again in 2001 and 2002, with inflation rate 11.51 percent and 11.88 percent, and then continued in 2005 and 2006 with 10.45 percent and 13.11 percent, inflation in 2000s caused by rising prices and a reduction in fuel subsidies because of rising world oil prices.

4.4. Exchange Rate

The exchange rate is an exchange between two different currencies, namely is the value or price comparison between two currencies. Comparison of this value is often referred to as the exchange rate. The exchange rate is usually changeable, exchange rate changes may include depreciation and appreciation. Basically, there are five types of exchange rate prevailing system (Kuncoro, 1996:27), they are floating exchange rate system, pegged exchange rate, crawling pegs, a basket of currencies, fixed exchange rate.

Based on graph 4.4 shown exchange rate rupiah to dollar in the period 1970-2013 (period average), in 1970s exchange rate rupiah to dollar strength enough, the price of the rupiah is 362 against U.S dollar and then increase become 391 in the next year.

Graph 4.4 Exchange rate rupiah Indonesia to dollar 1970-2013



Source: World Development Indicators

In 1972 to 1977 for six consecutive years the price of rupiah Indonesia stands at 415 of one U.S dollar, the floating exchange rate system in Indonesia is set along with rupiah devaluation in 1978 by 33 percent. In this system rupiah exchange rate against a basket currency floated countries of Indonesia's major trading partners, with this system Bank of Indonesia sets indication and let exchange rate move in the market with a certain spread. In order to maintain stability of rupiah, Bank of Indonesia intervened when the exchange rate exceeds the upper limit or the turbulent lower limit spread (Triyono, 2005). During a controlled floating exchange rate system implemented in Indonesia, rupiah from year by year continues to depreciate against U.S dollar. Exchange rate rupiah

fluctuates between 661 per U.S dollar. In other words, rupiah against U.S dollar tends not sure.

Entering 1990s exchange rate rupiah against dollar still depreciates, it proved in 1990 the exchange rate rupiah against dollar 1842 per U.S dollar, and always tends to depreciate until 1997 at level 2909 per U.S dollar. In 1998, in this world, there has been as sort of a recession, its impact on the economy in Indonesia, at the time still remember in our memories is the collapse of the rupiah exchange rate against a few foreign currencies including the U.S dollar, recorded in the rupiah against dollar is 14.000, it is the worst exchange rate ever.

After crisis, government tends to recovery economy Indonesia, but the exchange rate rupiah against U.S dollar still fluctuates, to overcome this situation the government did not stay silent. This is evidenced by the government issued several policies, either temporary or permanent policy. One is the government at that time issued a temporary policy led by the finance minister at the time. In a short-term economic policy that has two strategic objectives, first, reducing the negative impact of the crisis on low-income population and vulnerable, and second, the recovery of economic development to higher growth (Kartasasmita, 1998).

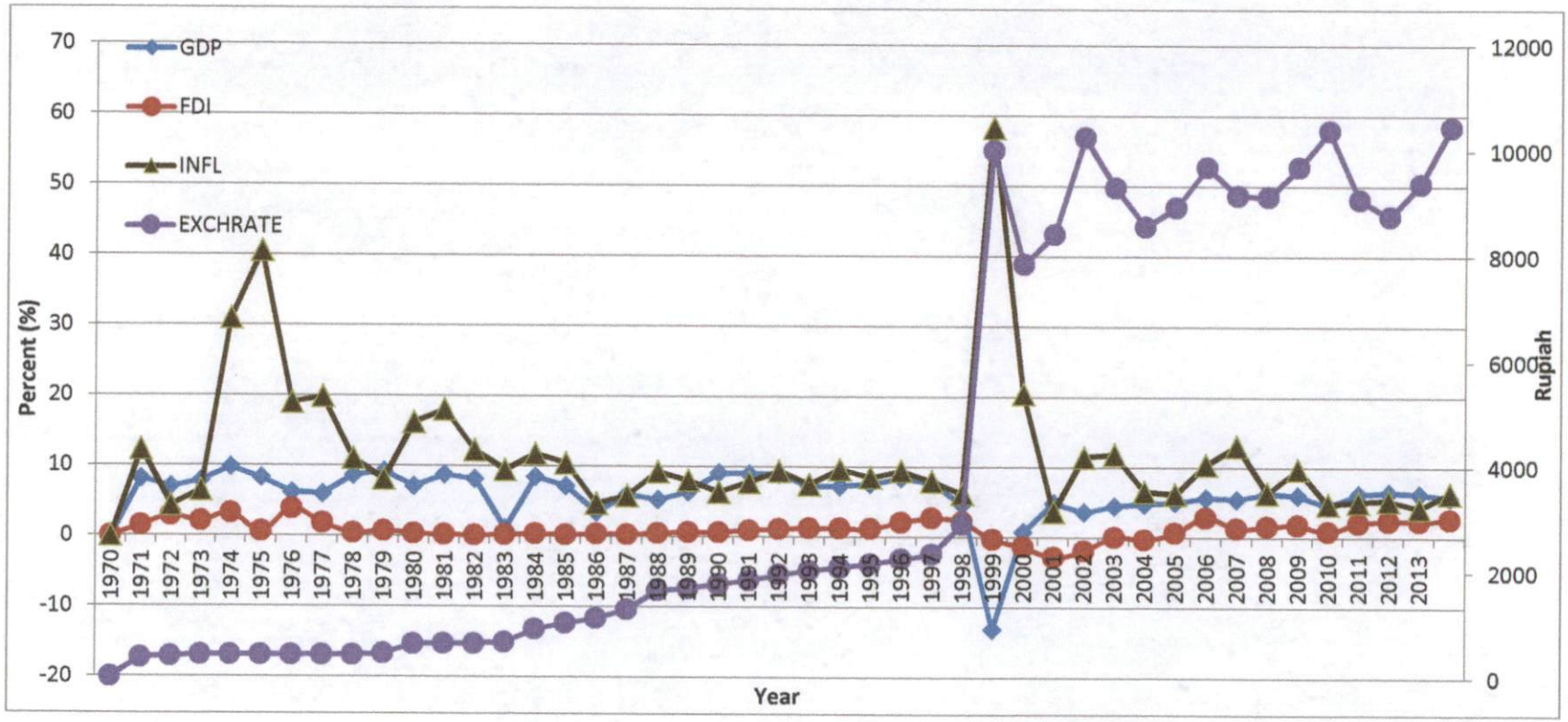
Weakening Indonesia's economic growth caused by the decline of the U.S dollar exchange rate, compounded by the events in world trade as expressed by Adwin S. Atmadja in the journal of Accounting and finance in 1999 that the economic crisis in Indonesia is the result of the Domino Effect of currency depreciation Thailand (Baht) and other countries, where one of them has resulted

in a surge in the price of goods and imported from abroad Indonesia which led to surge in domestic price drastically. From various background cause of the financial crisis has caused some economic problems such as high inflation and social issues unresolved such as unemployment.

However, when examined more deeply the actual impact of the financial crisis is over inflated, but this crisis has caused a real impact on the social life of the community. With the many effects caused by the crisis, the government issued a strategy with some policies for issues that would have to immediately get treatment so as not to cause severe impact. Government policies are primarily inflation and unemployment problem solving in order to stabilize the country's economy.

In 2013, rupiah weakened again, the exchange rate fell to 13.000 per U.S dollars, the highest exchange rate since crisis 1998. When rupiah continued to weaken the crisis 1998 it is not possible to be repeated.

Graph 4.5 FDI, GDP, Inflation and exchange rate in Indonesia 1970-2013



Source: Result Proceed

CHAPTER V

EMPIRICAL RESULT AND ANALYSIS

This chapter shows the empirical result of this research. The research used SVAR (Structural Vector Autoregression) approach. The empirical results of regression and the analysis about the impact of GDP, Inflation and Exchange rate on FDI in Indonesia. Estimation of the model will follow the following steps

5.1. Stationary Test

To estimate a VAR-model properly, we need stationary data. To see the stationary of data for each variable, it is tested by Unit Roots *Augmented Dickey-Fuller* (ADF) test and Unit Root *Phillips-Peroon* (PP) test. Unit root tests are conducted to determine the order of integration of the data series for each of the variables. The ADF and PP test was conducted at the level and first differences (1st).

Table 5.1 Unit Root Test Result with ADF Method

Variable	t-statistic	Prob	Level Differences	Trend Deterministic
FDI	-8.651298	0.0000	1st	Constant and Trend
GDP	-7.112426	0.0000	1st	Constant and Trend
INFL	-7.468525	0.0000	1st	Constant and Trend
EXCHRATE	-7.910757	0.0000	1st	Constant and Trend

Source: Result Proceed

The estimated results from table 5.1 and table 5.2 show that all data are stationer by ADF test and PP test, because ADF t-statistic and PP t-statistic bigger than 1% level, 5% level, and 10% level test critical values and probability value is less than critical value 5% (0.0000 < 0.05), it is means the data already stationer at difference level 1. When all data stationer is ready, the estimation can be continued to VAR analysis.

Table 5.2. Unit Root Test Results with PP Method

Variable	t-statistic	Prob	Level Differences	Trend Deterministic
FDI	-8.651298	0.0000	1st	Constant and Trend
GDP	-4.694391	0.0026	Level	Constant and Trend
INFL	-18.48263	0.0000	1st	Constant and Trend
EXCHRATE	-8.081831	0.0000	1st	Constant and Trend

Source: Result Proceed

Stationary test is necessary because the data are not stationary will lead to biased results because the regression results derived from non-stationary data will cause a spurious regression. Spurious regression caused regression estimation results that have a high R square, but no significant relationship between variables (Gujarati, 1998).

5.2. Lag Length Selection

Before do to co-integration test it must determine the lag length selection. This test needs to determine the best lag that use in the co-integration test.

Inaccurate lag will influences to ambiguous results. The optimum lag means how many period that need by the model to affected by policy outcomes. The lag selection criteria are Akaike Information Criterion (AIC), Schwarz Information Criterion (SC), Hannan-Quinn Criterion (HQ), Final Prediction Error (FPE). The AIC and SIC are the most well known. The following table will show lag length criteria result:

Table 5.3 Lag Length Selection

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-748.6408	NA	1.88e+10	35.00655	35.17038	35.06696
1	-646.2005	181.0573*	3.38e+08*	30.98607*	31.80523*	31.28815*

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

Source: Result Proceed

From the eviews process get the result as described in the table 5.3. The star sign on the table indicates the minimum lag based on all the criteria. Based on the table 5.3, LR, FPE, AIC, SC and HQ criteria show the optimum lag at 1. For the consequences, in this research use this optimum lag to strength the analysis and forecasting.

5.3. Co-integration Test

After determining the lag selection we test for the co-integration, this test purpose to determine the relationship among variable. Whether the relationship in short-run or long-run periods. This test also determines the model that uses, whether VAR or VECM. It depends on the result is co-integration or not. If the

result is co-integration, we must use VECM. It means the model has long run relationship. If the result is not co-integration, we must use VAR. It means the model has a short-run relationship.

Table 5.4 Coefficient Co-integration Test

Unrestricted Cointegration Rank Test (Trace)				
Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.647378	77.33656	47.85613	0.0000
At most 1 *	0.405592	33.55751	29.79707	0.0176
At most 2	0.231849	11.70959	15.49471	0.1714
At most 3	0.014918	0.631293	3.841466	0.4269

Trace test indicates 2 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values
Source: Result Proceed

The test shows the trace statistic value is 77.33656 which bigger than 0.05 critical values (47.85613) and the eigenvalue is 0.647378. The co-integration test result of this study is an incentive to the inclusion of intercept and/or trend. It means that the data are co-integrated, these are two co-integrating vectors. So, examining this research can not use VAR to analyze and must be continued to VECM.

5.4. Granger Causality Test

Granger causality test is applied in a stationary series. This test analysis the fact that between two given factors which one is the causing one and which factor is getting affected by another. Granger causality test by using the optimum lag has been done before on lag length selection. If value of probability less than

1% 5% 10% of significant level and F-statistics obtained greater than the value of its probability, thus both variables are statistically exist Granger causality relationship.

Table 5.5 Granger Causality Test

Pairwise Granger Causality Tests
Lags: 1

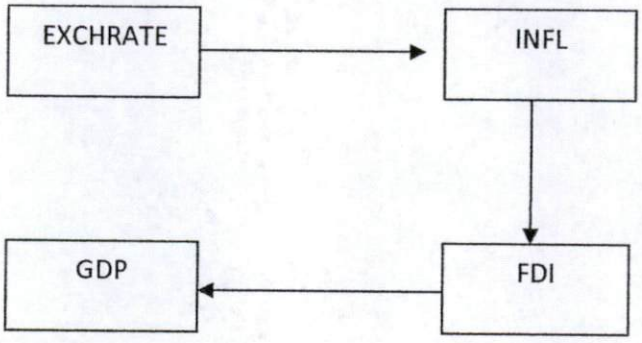
Null Hypothesis:	Obs	F-Statistic	Prob.
INFL does not Granger Cause GDP	43	0.66153	0.4208
GDP does not Granger Cause INFL		0.70480	0.4062
EXCHRATE does not Granger Cause GDP	43	0.39101	0.5353
GDP does not Granger Cause EXCHRATE		0.96185	0.3326
FDI does not Granger Cause GDP	43	0.10059	0.7528
GDP does not Granger Cause FDI		4.86783	*0.0332
EXCHRATE does not Granger Cause INFL	43	2.07365	0.1576
INFL does not Granger Cause EXCHRATE		4.86000	*0.0333
FDI does not Granger Cause INFL	43	3.30375	*0.0766
INFL does not Granger Cause FDI		1.68524	0.2017
FDI does not Granger Cause EXCHRATE	43	0.38336	0.5393
EXCHRATE does not Granger Cause FDI		0.04198	0.8387

Source: Result Proceed

Table 5.5 describes the relationship among variables (Granger Causality) and the results, for examples between INFL and EXCHRATE have unidirectional relationship, where INFL has the value of probability is less than 5% ($0.0333 < 0.05$) its mean INFL does not granger cause EXCHRATE, but EXCHRATE has the probability is bigger than 5% ($0.1576 > 0.05$) its mean EXCHRATE granger cause INFL (EXCHRATE → INFL). Then, between GDP and FDI have unidirectional relationship, where GDP have the value of probability is less than 5% ($0.0332 < 0.05$) its mean GDP does not granger cause FDI, but FDI has the probability is bigger than 5% ($0.7528 > 0.05$), its mean FDI granger cause GDP

(FDI → GDP). And the last between INFL and FDI have also unidirectional relationship, where INFL has the value of probability is bigger than 5% (0.2017 > 0.05), its mean INFL granger cause FDI (INFL → FDI), but FDI has the probability is less than 5% (0.0766 < INFL), its mean FDI does not granger cause FDI. For the other Granger Causality is not statistically significant, because the probability is greater than 0.05 or 5 percent.

To see the relationship between variable, in Granger Causality test, there is a figure to make more clear:



5.5. VAR Stability Test

To see the stability of the VAR equation system we have to test the data by AR Roots Polynomial and AR Roots Graph. The VAR stability test in this research is shown by this following table and graph:

Table 5.6 The Result VAR Stability Condition Check

Roots of Characteristic Polynomial
Endogenous variables: D(GDP) D(INFLATION)
D(EXCHRATE) D(FDI)
Exogenous variables: C
Lag specification: 1 1

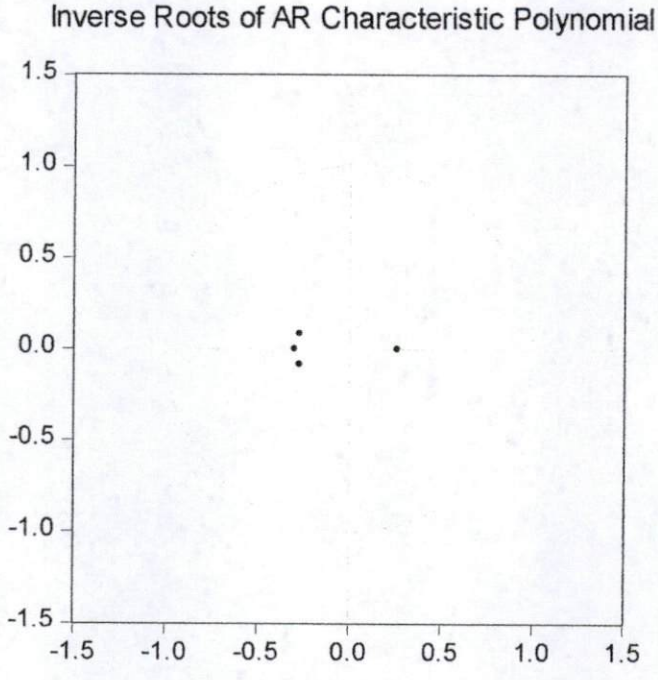
Date: 07/23/15 Time: 12:31

Root	Modulus
-0.297917	0.297917
-0.269741 - 0.083639i	0.282411
-0.269741 + 0.083639i	0.282411
0.260549	0.260549

No root lies outside the unit circle.
VAR satisfies the stability condition.

Source: Result Processed

Graph 5.1



Source: Result Processed

Data is stable if all the data has modulus less than 1 and are in the unit circle. In table 5.6 it can be seen that data is tested by using the VAR is stable. Similarly, shown by graph 5.1 where the points are inside the unit circle so that data is stable.

5.6. VECM (Vector Error Correction Model)

After having done by VAR estimation, it had been found that the data are co-integrated. So it means that the estimation is continued to VECM.

5.6.1. VECM Stability Test

To see the stability of the VECM equation system we have to test the data by AR Roots Polynomial and AR Roots Graph. It same as a VAR stability test. The VECM stability test in this research is shown by the following table and graph:

Table 5.7 The Result VECM Stability Condition Check

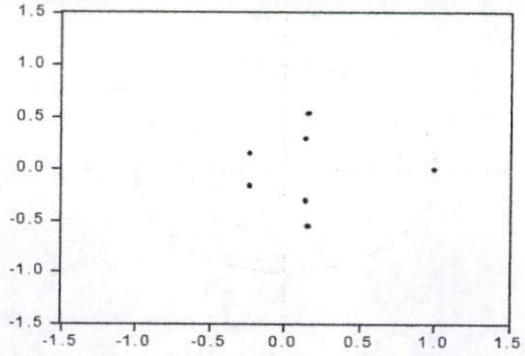
Root	Modulus
1.000000	1.000000
1.000000	1.000000
0.155667 - 0.543194i	0.565059
0.155667 + 0.543194i	0.565059
0.135845 - 0.300327i	0.329621
0.135845 + 0.300327i	0.329621
-0.231761 - 0.156496i	0.279650
-0.231761 + 0.156496i	0.279650

VEC specification imposes 2 unit root(s).

Source: Result Processed

Table 5.7 shows that the modulus values of some data are 1, it means that the data that are used in this research in unstable. This is emphasized also by Graph 5.2 that there is a point outside the unit circle, it means that the data are unstable.

Graph 5.2 The Result VECM Stability Test in Unit Circle



Source: Results Proceed

5.7. SVAR (Structural Vector Autoregression) Model

After having done by VECM estimation, it had been found that the data are unstable. So, the estimation is continued by using SVAR. SVAR model focuses on Impulse Response Function (IRF) and Forecast Error Variance Decomposition (FEVD) (Gujarati, 1998). IRF and FEVD prove that the relationship among variables are positive or negative relationship. The relationship among variables in SVAR show by matrix. The result of matrix estimation by SVAR is shown by the following table:

Table 5.8 SVAR Estimation

@e1 = C(1)*@u1
@e2 = C(2)*@e1 + C(3)*@u2
@e3 = C(4)*@e1 + C(5)*@e2 + C(6)*@u3
@e4 = C(7)*@e1 + C(8)*@e2 + C(9)*@e3 + C(10)*@u4
Where
@e1 represents GDP residuals
@e2 represents INFL residuals
@e3 represents EXCHRATE residuals
@e4 represents FDI residuals

	Coefficient	Std. Error	z-Statistic	Prob.
C(2)	-1.786918	0.319913	-5.585630	0.0000
C(4)	-213.3419	34.71566	-6.145409	0.0000
C(5)	40.78116	12.59776	3.237176	0.0012
C(7)	0.032086	0.074162	0.432656	0.6653
C(8)	-0.009510	0.021899	-0.434257	0.6641

C(9)	-0.000123	0.000238	-0.517118	0.6051
C(1)	3.501132	0.377537	9.273618	0.0000
C(3)	7.344719	0.792001	9.273618	0.0000
C(6)	606.7399	65.42645	9.273618	0.0000
C(10)	0.945750	0.101983	9.273618	0.0000
Log likelihood	-656.8313			
Estimated A matrix:				
1.000000	0.000000	0.000000	0.000000	
1.786918	1.000000	0.000000	0.000000	
213.3419	-40.78116	1.000000	0.000000	
-0.032086	0.009510	0.000123	1.000000	
Estimated B matrix:				
3.501132	0.000000	0.000000	0.000000	
0.000000	7.344719	0.000000	0.000000	
0.000000	0.000000	606.7399	0.000000	
0.000000	0.000000	0.000000	0.945750	

From the SVAR estimate table 5.8, the result for long term is not significant effect among variables during the research period. In short term, all variables are influenced significantly in period 1,2,3,4,6,10. In conclusion, among the variables there is no significant relationship in long term.

5.7.1 SVAR Stability Test

To see the stability of the SVAR equation system we have to test the data by AR Roots Polynomial and AR Roots Graph. The SVAR stability test in this research is shown by this following table and graph:

Table 5.9 SVAR Stability Condition Test

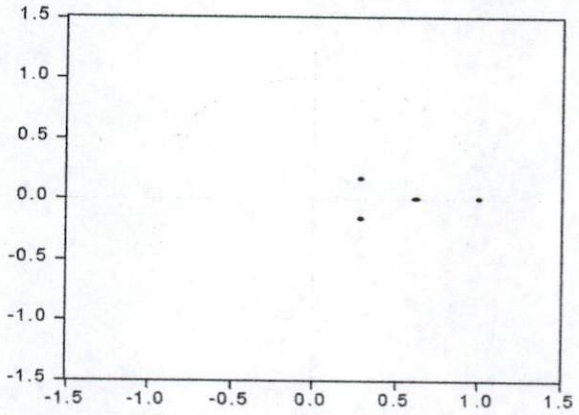
Root	Modulus
0.991395	0.991395
0.616504	0.616504
0.282698 - 0.165510i	0.327585
0.282698 + 0.165510i	0.327585

No root lies outside the unit circle.
VAR satisfies the stability condition.

Source: Result Proceed

Table 5.9 shows that the modulus values of some data are less than 1, it means that the data that are used in this research is stable. This is emphasized also by Graph 5.3 that there is a point inside the unit circle, it means that the data are stable.

Graph 5.3 The Result SVAR Stability Test in Unit Circle



Source: Result Proceed

5.8 Correlation Matrix

If the value of residual correlation is almost less than 0.2, it means the author does not need to change the structure of model, and does not need to test the causality again. Based on table 5.10, the value of residual correlation is almost less than 0.2, so the structure of model can be used in this research.

Table 5.10 SVAR Correlation Matrix

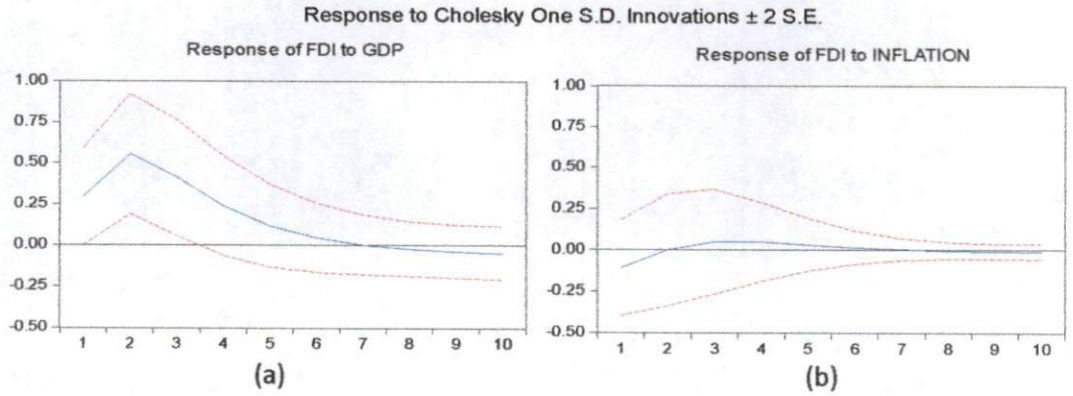
	GDP	INFL	EXCHRATE	FDI
GDP	1.000000	-0.648444	-0.828755	0.295246
INFL	-0.648444	1.000000	0.725981	-0.272715
EXCHRATE	-0.828755	0.725981	1.000000	-0.308585
FDI	0.295246	-0.272715	-0.308585	1.000000

Source: Result Processed

5.9. Impulse Response Function (IRF)

The analysis of *Impulse Response Functions* (IRFs) are based on the values of the coefficient IRFs that describes information about how big the response of one endogenous variable to the change one standard deviation on all endogenous variables. In other words, it also shows how big the impact of short-term and long-term caused by 1 standard deviation change from one of the endogenous variables on all endogenous variables in the SVAR model. Basically in this analyses will be known positive or negative response of a variable to another variable. The response in the short term is usually quite significant and likely to change. The long term response tends to be consistent and continued to shrink. For ease of interpretation, the results of the analysis will be presented in graphical form. The IRF function is alternate of variance decomposition approach and show the reaction in one variable due to shocks stemming in another variable (Ayadi, 2014). By using IRF it will show how the shock of one variable affect to other variable in the specified period, this study used to explore how the variables of foreign direct investment (FDI) to response to the gross domestic product (GDP), inflation and exchange rate.

Graph 5.4 IRF FDI to Shock GDP and Inflation



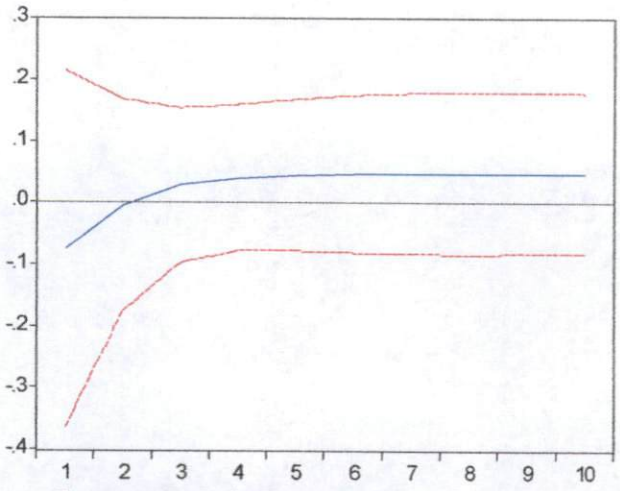
Source: Result Processed

Graph 5.4 (a) describes response of FDI to GDP and inflation. Shock on the GDP had a negative impact on FDI. The impact of response that accepted by FDI due to shock of GDP along 10^{th} period is divergence. Generally, the FDI will response negatively to an increase in the FDI. In other words, decreasing of GDP will affect on FDI. Research by Sajid Anwar and Phi Nguyen (2010), studied relationship between FDI and economic growth, they found the direct effect of FDI on economic growth in Vietnam is positive. Research by Hooi Hooi Lean (2008), he found that no evidence of causation running from the increase in FDI to GDP growth or vice verse in both the short run and long run. Overall, relationship between FDI and growth of the Malaysian manufacturing sector is independent.

Based on graph 5.4 (b) it can be seen the response of FDI to inflation. Shock on the inflation has positive impact to FDI. That is, the variables response positively to FDI from an increase in inflation. The impact of response that accepted by FDI due to shock of inflation along 10^{th} period is convergence.

Graph 5.5 show the response of FDI to exchange rate. Shock on exchange rate has positive impact to FDI. The impact of response that accepted by FDI due to shock of exchange rate along 10^{th} period is convergence. Generally, FDI will response positively to an increase in the exchange rate.

Graph 5.5 IRF FDI to Exchange rate



Source: Result Processed

5.10. Forecast Error Variance Decomposition (FEVD)

The generalized FEVD approach estimates the simultaneous shock effects. Engle and Granger (1987) argued that in VAR framework, variance decomposition approach produces better results as compared to the other traditional framework (Ayadi, 2014). With *Forecast Error Variance Decomposition* (FEVD) analysis, it can be known the persentation variation of an endogenous variable that explained by each of the existing problems in the SVAR model. In other words FEVD analysis is used to determine which variables are most important in explaining changes in a variable. To examine this, the author applied the generalized FEVD, which measures the percentage of a variable's forecast error variance that occur as a result of a shock of a variable from a system. Because that is the focus of this research is to track the impact of the variable shock Gross Domestic Product (GDP), Inflation (INFL) and exchange rate (EXCHRATE) to Foreign Direct Investment (FDI) in Indonesia, therefore it

is preferred to analyze the variance decomposition of the variable Foreign Direct Investment (FDI).

Table 5.11 Variance Decomposition of FDI

Period	S.E.	GDP	INFL	EXCHRATE	FDI
1	0.999207	8.716997	1.139555	0.557125	89.58632
2	1.258356	24.96371	0.718526	0.352021	73.96575
3	1.355220	30.71075	0.756720	0.347530	68.18500
4	1.386532	32.29441	0.847316	0.417631	66.44065
5	1.395560	32.58934	0.887964	0.516259	66.00644
6	1.398128	32.57013	0.896652	0.626127	65.90709
7	1.399270	32.51706	0.895877	0.740245	65.84682
8	1.400397	32.49425	0.895127	0.855423	65.75520
9	1.401806	32.50663	0.896698	0.970016	65.62665
10	1.403483	32.54600	0.900467	1.083119	65.47041

Source: Result Processed

Table 5.11 shows the variance decomposition of Foreign Direct Investment (FDI) due to shock of the variable Gross Domestic Product (GDP), Inflation (INFL) and Exchange rate (EXCHRATE). In period 1, the contribution of monetary variables to FDI are quite diverse. Beside the affect by the FDI itself, the movement of FDI also influenced by GDP as 8.7% and INFL as 1.1%, while the shock of other variables does not give the significant change on the movement of FDI. In the next period until the end of the period, there was a continuous decline of FDI shock to FDI itself. However, the contribution of other variables such as GDP, INFL and EXCHRATE increase continuously, it means there is increasing influence of other variables to change in FDI. Overall, the most influential variables to change in FDI is GDP which is at the beginning of the period amounted by 8.7% of FDI and tend to increase until the end of period. At the end of period, the effect of GDP shock to FDI as 32.5%.

5.11. Economic Analysis

The Granger causality analysis indirectly shows that the FDI in Indonesia can be affected by inflation. With unstable economic conditions in Indonesia now days, will cause instability in inflation too, of course with unstable of inflation or high inflation will make investors will think twice to invest their money in Indonesia, and as we know FDI has a role in increasing revenue and indirectly will increase to GDP due to presence of FDI will create new jobs and reduce unemployment. To anticipate the instability of inflation, the government should maintain the stability of the rupiah against U.S dollar because we know that is U.S dollar is the benchmark for the exchange rate in the world. If the exchange rate against U.S dollar is higher then it will lead to higher inflation, the government would have policies to solve this problem, as we know, Indonesia is one of the aim for the investors to do investment activities, but because of the problem of higher inflation, investors won't want to invest their money in Indonesia, then it also has an impact on GDP.

FEVED analysis clearly shows better result in analysis the relationship among variables in this research, the short run even in the long run. In the short run GDP influence by FDI is still lower, the result also found by Enu and Dodzi (2013) which examines the impact of macroeconomic factors on foreign direct investment in Ghana using VAR (Vector Autoregression) method which used variables FDI, GDP, inflation, exchange rate and trade openness, the result shows that there is no long run relationship among the variables. Lean (2008) also found there is no long run relationship between FDI and GDP in the manufacturing sector in Malaysia over the period 1980-2005. There is also no evidence of

causation running from the increase in FDI to GDP growth or vice versa in both the short run and long run.

CHAPTER VI

CONCLUSION AND RECOMMENDATIONS

6.1. Conclusions

This research analyzes the impact of GDP, Inflation and Exchange rate on FDI in Indonesia. The method applied by using Structural Vector Autoregression (SVAR). A test result of stationarity data is by using unit roots Philips-Perron (PP) test and unit roots augmented Dickey Fuller (ADF). The ADF and PP test results for all variables are stationer in first differences. Data are co-integrated in the long run. The optimum lag that applied in this research is lag one based on AIC, SC and HQ lag criterion.

Granger causality result show that only one way relationship between variable. It means, when the first variable affecting second variable, the second variable doesn't affect the first variable. The one way relationship, with the result are exchange rate to inflation, inflation to FDI and FDI to GDP.

Impulse response function shows the shock of GDP because influence by FDI is positive at the beginning, but give negative for long term. FDI to inflation is negative at the first period and stagnant for the long period. And then the shock of FDI to exchange rate is negative at the beginning and always increase in next period and stagnant for a long time. The highest influence to FDI based on variance decomposition is influenced by GDP.

6.2. Recommendation

This research focus on the impact of GDP, Inflation and Exchange rate on FDI in Indonesia period 1970-2013 by using variable foreign direct investment (FDI), gross domestic product (GDP), inflation and exchange rate. Based on the analysis, generally GDP is positively affecting to FDI in Indonesia.The fall of price rupiah against dollar made some sectors of the economy to be disturbed, to attract foreign investor to invest their money in Indonesia is to keep the exchange rate stable, with stable exchange rate so fluctuate of inflation will be reduced and on the reduce inflation rate would improve economic conditions and stable, with stable economy, rupiah exchange rate against dollar will appreciate, in line with the higher price of the rupiah against dollar, so domestic investor and foreign investor will be interested and will invest in Indonesia, with many investors are interested and invest their money in Indonesia, so Indonesia's GDP will increase, because with existing investors will create new job and will increase revenue and reduce unemployment.

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APPENDIX

APPENDIX 1

Unit Root Test Result by using Augmented Dickey-Fuller (ADF) Test and Phillips-Perron (PP) Test

FDI in 1st Difference (ADF Test)

Null Hypothesis: D(FDI) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic based on SIC, MAXLAG=7)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-8.651298	0.0000
Test critical values:	1% level	-4.192337	
	5% level	-3.520787	
	10% level	-3.191277	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(FDI,2)
Method: Least Squares
Date: 04/03/15 Time: 21:14
Sample (adjusted): 1972 2013
Included observations: 42 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(FDI(-1))	-1.290199	0.149134	-8.651298	0.0000
C	-0.313115	0.354951	-0.882135	0.3831
@TREND(1970)	0.013967	0.013903	1.004608	0.3213

R-squared	0.657933	Mean dependent var	-0.027588
Adjusted R-squared	0.640391	S.D. dependent var	1.816887
S.E. of regression	1.089540	Akaike info criterion	3.078138
Sum squared resid	46.29684	Schwarz criterion	3.202257
Log likelihood	-61.64090	Hannan-Quinn criter.	3.123633
F-statistic	37.50631	Durbin-Watson stat	1.977132
Prob(F-statistic)	0.000000		

FDI in 1st Difference (PP test)

Null Hypothesis: D(FDI) has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 0 (Newey-West using Bartlett kernel)

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-8.651298	0.0000
Test critical values:	1% level	-4.192337	
	5% level	-3.520787	
	10% level	-3.191277	

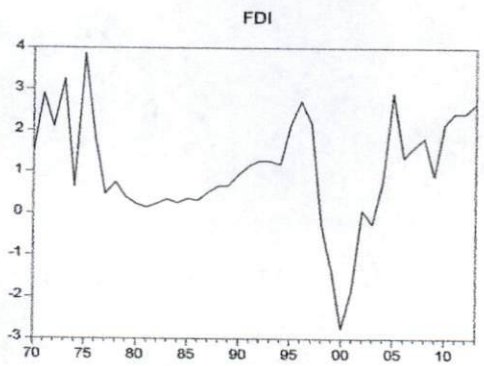
*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	1.102306
HAC corrected variance (Bartlett kernel)	1.102306

Phillips-Perron Test Equation
Dependent Variable: D(FDI,2)
Method: Least Squares
Date: 04/03/15 Time: 21:18
Sample (adjusted): 1972 2013
Included observations: 42 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(FDI(-1))	-1.290199	0.149134	-8.651298	0.0000
C	-0.313115	0.354951	-0.882135	0.3831
@TREND(1970)	0.013967	0.013903	1.004608	0.3213

R-squared	0.657933	Mean dependent var	-0.027588
Adjusted R-squared	0.640391	S.D. dependent var	1.816887
S.E. of regression	1.089540	Akaike info criterion	3.078138
Sum squared resid	46.29684	Schwarz criterion	3.202257
Log likelihood	-61.64090	Hannan-Quinn criter.	3.123633
F-statistic	37.50631	Durbin-Watson stat	1.977132
Prob(F-statistic)	0.000000		



GDP in 1st Difference (ADF Test)

Null Hypothesis: D(GDP) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 1 (Automatic based on SIC, MAXLAG=7)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-7.112426	0.0000
Test critical values:	1% level	-4.198503	
	5% level	-3.523623	
	10% level	-3.192902	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(GDP,2)
Method: Least Squares
Date: 04/03/15 Time: 21:22
Sample (adjusted): 1973 2013
Included observations: 41 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(GDP(-1))	-1.755802	0.246864	-7.112426	0.0000
D(GDP(-1),2)	0.357782	0.153394	2.332429	0.0252
C	-0.335499	1.334953	-0.251319	0.8030
@TREND(1970)	0.011416	0.051609	0.221211	0.8261

R-squared	0.691914	Mean dependent var	-0.033360
Adjusted R-squared	0.666934	S.D. dependent var	6.771129
S.E. of regression	3.907748	Akaike info criterion	5.656267
Sum squared resid	565.0082	Schwarz criterion	5.823445
Log likelihood	-111.9535	Hannan-Quinn criter.	5.717144
F-statistic	27.69873	Durbin-Watson stat	2.093846
Prob(F-statistic)	0.000000		

GDP in Level (PP Test)

Null Hypothesis: GDP has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 0 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-4.694391	0.0026
Test critical values:	1% level	-4.186481	
	5% level	-3.518090	
	10% level	-3.189732	

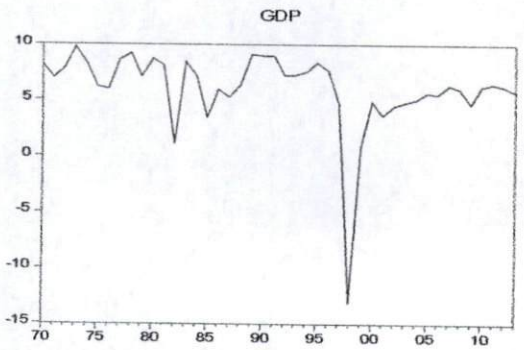
*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	10.66050
HAC corrected variance (Bartlett kernel)	10.66050

Phillips-Perron Test Equation
Dependent Variable: D(GDP)
Method: Least Squares
Date: 05/02/15 Time: 21:40
Sample (adjusted): 1971 2013
Included observations: 43 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GDP(-1)	-0.712768	0.151834	-4.694391	0.0000
C	5.486144	1.601822	3.424940	0.0014
@TREND("1970")	-0.055730	0.043636	-1.277158	0.2089

R-squared	0.355450	Mean dependent var	-0.055137
Adjusted R-squared	0.323223	S.D. dependent var	4.115003
S.E. of regression	3.385267	Akaike info criterion	5.343957
Sum squared resid	458.4014	Schwarz criterion	5.466831
Log likelihood	-111.8951	Hannan-Quinn criter.	5.389269
F-statistic	11.02942	Durbin-Watson stat	1.938268
Prob(F-statistic)	0.000153		



Inflation in 1st difference (ADF Test)

Null Hypothesis: D(INFL) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 1 (Automatic based on SIC, MAXLAG=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-7.468525	0.0000
Test critical values:	1% level	-4.198503	
	5% level	-3.523623	
	10% level	-3.192902	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(INFL,2)
Method: Least Squares
Date: 04/04/15 Time: 19:19
Sample (adjusted): 1973 2013
Included observations: 41 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(INFL(-1))	-1.771759	0.237230	-7.468525	0.0000
D(INFL(-1),2)	0.408044	0.149103	2.736654	0.0095
C	1.523049	3.856027	0.394979	0.6951
@TREND(1970)	-0.069381	0.149180	-0.465080	0.6446

R-squared	0.691134	Mean dependent var	-0.000495
Adjusted R-squared	0.666090	S.D. dependent var	19.51726
S.E. of regression	11.27803	Akaike info criterion	7.776058
Sum squared resid	4706.176	Schwarz criterion	7.943236
Log likelihood	-155.4092	Hannan-Quinn criter.	7.836935
F-statistic	27.59764	Durbin-Watson stat	2.034398
Prob(F-statistic)	0.000000		

Inflation in 1st difference (PP Test)

Null Hypothesis: D(INFL) has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 22 (Newey-West using Bartlett kernel)

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-18.48263	0.0000
Test critical values:	1% level	-4.192337	
	5% level	-3.520787	
	10% level	-3.191277	

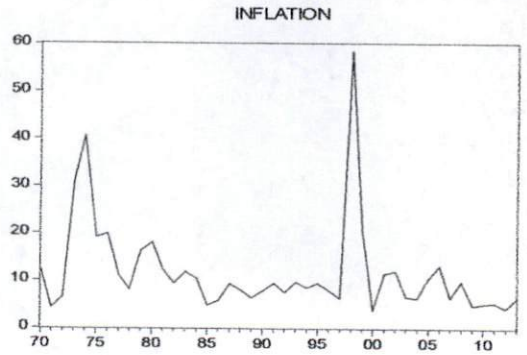
*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	134.7555
HAC corrected variance (Bartlett kernel)	11.11500

Phillips-Perron Test Equation
Dependent Variable: D(INFL,2)
Method: Least Squares
Date: 04/04/15 Time: 19:20
Sample (adjusted): 1972 2013
Included observations: 42 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(INFL(-1))	-1.256441	0.153877	-8.165213	0.0000
C	1.136621	3.919782	0.289970	0.7734
@TREND(1970)	-0.050532	0.153405	-0.329401	0.7436

R-squared	0.630985	Mean dependent var	0.241054
Adjusted R-squared	0.612061	S.D. dependent var	19.34123
S.E. of regression	12.04663	Akaike info criterion	7.884196
Sum squared resid	5659.731	Schwarz criterion	8.008316
Log likelihood	-162.5681	Hannan-Quinn criter.	7.929691
F-statistic	33.34339	Durbin-Watson stat	2.212679
Prob(F-statistic)	0.000000		



Exchange Rate in 1st Difference (ADF Test)

Null Hypothesis: D(EXCHRATE) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic based on SIC, MAXLAG=7)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-7.910757	0.0000
Test critical values:	1% level	-4.192337	
	5% level	-3.520787	
	10% level	-3.191277	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(EXCHRATE,2)
Method: Least Squares
Date: 04/03/15 Time: 21:29
Sample (adjusted): 1972 2013
Included observations: 42 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(EXCHRATE(-1))	-1.235963	0.156238	-7.910757	0.0000
C	70.99825	402.8054	0.176259	0.8610
@TREND(1970)	9.753148	15.78269	0.617965	0.5402

R-squared	0.616141	Mean dependent var	24.89450
Adjusted R-squared	0.596456	S.D. dependent var	1948.056
S.E. of regression	1237.505	Akaike info criterion	17.14833
Sum squared resid	59725346	Schwarz criterion	17.27245
Log likelihood	-357.1150	Hannan-Quinn criter.	17.19383
F-statistic	31.29987	Durbin-Watson stat	2.082330
Prob(F-statistic)	0.000000		

Exchange Rate in 1st difference (PP Test)

Null Hypothesis: D(EXCHRATE) has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 2 (Newey-West using Bartlett kernel)

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-8.081831	0.0000
Test critical values:	1% level	-4.192337	
	5% level	-3.520787	
	10% level	-3.191277	

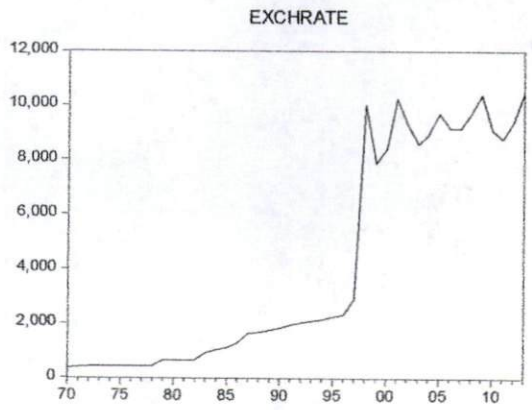
*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	1422032.
HAC corrected variance (Bartlett kernel)	1191971.

Phillips-Perron Test Equation
Dependent Variable: D(EXCHRATE,2)
Method: Least Squares
Date: 04/03/15 Time: 21:31
Sample (adjusted): 1972 2013
Included observations: 42 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(EXCHRATE(-1))	-1.235963	0.156238	-7.910757	0.0000
C	70.99825	402.8054	0.176259	0.8610
@TREND(1970)	9.753148	15.78269	0.617965	0.5402

R-squared	0.616141	Mean dependent var	24.89450
Adjusted R-squared	0.596456	S.D. dependent var	1948.056
S.E. of regression	1237.505	Akaike info criterion	17.14833
Sum squared resid	59725346	Schwarz criterion	17.27245
Log likelihood	-357.1150	Hannan-Quinn criter.	17.19383
F-statistic	31.29987	Durbin-Watson stat	2.082330
Prob(F-statistic)	0.000000		



APPENDIX 2

Lag Length

VAR Lag Order Selection Criteria
Endogenous variables: EXCHRATE FDI GDP INFL
Exogenous variables: C
Date: 04/04/15 Time: 20:00
Sample: 1970 2013
Included observations: 43

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-748.6408	NA	1.88e+10	35.00655	35.17038	35.06696
1	-646.2005	181.0573*	3.38e+08*	30.98607*	31.80523*	31.28815*

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

APPENDIX 3

Cointegration Test

Sample (adjusted): 1972 2013
Included observations: 42 after adjustments
Trend assumption: Linear deterministic trend
Series: GDP INFLATION EXCHRATE FDI
Lags interval (in first differences): 1 to 1

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.647378	77.33656	47.85613	0.0000
At most 1 *	0.405592	33.55751	29.79707	0.0176
At most 2	0.231849	11.70959	15.49471	0.1714
At most 3	0.014918	0.631293	3.841466	0.4269

Trace test indicates 2 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.647378	43.77905	27.58434	0.0002

At most 1 *	0.405592	21.84792	21.13162	0.0396
At most 2	0.231849	11.07829	14.26460	0.1503
At most 3	0.014918	0.631293	3.841466	0.4269

Max-eigenvalue test indicates 2 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegrating Coefficients (normalized by b'*S11*b=I):

GDP	INFL	EXCHRATE	FDI
-0.490742	-0.000817	-0.000135	0.443052
-0.278441	-0.154649	-0.000160	0.345325
0.140974	0.035765	-8.53E-05	0.611962
-0.082263	0.000615	-0.000253	-0.544404

Unrestricted Adjustment Coefficients (alpha):

D(GDP)	1.548488	-0.388643	-1.050963	0.288062
D(INFL)	-2.446649	6.043722	1.591305	-0.460721
D(EXCHRATE)	-34.60285	349.6924	171.0343	-117.0511
D(FDI)	-0.582553	-0.073589	-0.359302	0.014492

1 Cointegrating Equation(s): Log likelihood -628.2583

Normalized cointegrating coefficients (standard error in parentheses)

GDP	INFL	EXCHRATE	FDI
1.000000	0.001664	0.000275	-0.902821
	(0.03447)	(6.9E-05)	(0.23980)

Adjustment coefficients (standard error in parentheses)

D(GDP)	-0.759908
	(0.28740)
D(INFL)	1.200672
	(0.90286)
D(EXCHRATE)	16.98106
	(96.2624)
D(FDI)	0.285883
	(0.07275)

2 Cointegrating Equation(s): Log likelihood -617.3343

Normalized cointegrating coefficients (standard error in parentheses)

GDP	INFL	EXCHRATE	FDI
1.000000	0.000000	0.000274	-0.901807
		(6.9E-05)	(0.24021)
0.000000	1.000000	0.000544	-0.609281
		(0.00038)	(1.32295)

Adjustment coefficients (standard error in parentheses)

D(GDP)	-0.651693	0.058839
	(0.32836)	(0.09000)
D(INFL)	-0.482147	-0.932659
	(0.86333)	(0.23663)
D(EXCHRATE)	-80.38763	-54.05142
	(105.533)	(28.9259)

D(FDI)	0.306373	0.011856
	(0.08335)	(0.02284)

3 Cointegrating Equation(s): Log likelihood -611.7952

Normalized cointegrating coefficients (standard error in parentheses)

GDP	INFL	EXCHRATE	FDI
1.000000	0.000000	0.000000	0.553092
			(0.59138)
0.000000	1.000000	0.000000	2.278512
			(1.60640)
0.000000	0.000000	1.000000	-5307.703
			(2029.20)

Adjustment coefficients (standard error in parentheses)

D(GDP)	-0.799852	0.021251	-5.70E-05
	(0.32230)	(0.08797)	(0.00013)
D(INFL)	-0.257814	-0.875746	-0.000775
	(0.87601)	(0.23909)	(0.00034)
D(EXCHRATE)	-56.27619	-47.93436	-0.066024
	(107.470)	(29.3326)	(0.04183)
D(FDI)	0.255721	-0.000994	0.000121
	(0.07831)	(0.02137)	(3.0E-05)

APPENDIX 3

VAR Estimate

Vector Autoregression Estimates
Date: 04/04/15 Time: 19:25
Sample (adjusted): 1971 2013
Included observations: 43 after adjustments
Standard errors in ( ) & t-statistics in [ ]

	EXCHRATE	FDI	GDP	INFL
EXCHRATE(-1)	0.955764	6.27E-05	-5.72E-05	-0.000540
	(0.05716)	(4.7E-05)	(0.00017)	(0.00046)
	[16.7198]	[1.32819]	[-0.34575]	[-1.18442]
FDI(-1)	91.65841	0.556271	-0.179196	1.963857
	(151.906)	(0.12553)	(0.43985)	(1.21211)
	[0.60339]	[4.43130]	[-0.40740]	[1.62020]
GDP(-1)	-42.17944	0.139592	0.403432	-0.258612
	(76.9442)	(0.06359)	(0.22280)	(0.61396)
	[-0.54818]	[2.19535]	[1.81076]	[-0.42122]
INFL(-1)	-46.94785	0.005555	0.044491	0.257828
	(23.3534)	(0.01930)	(0.06762)	(0.18634)
	[-2.01032]	[0.28785]	[0.65793]	[1.38361]

C	1129.839 (819.379) [1.37890]	-0.677592 (0.67712) [-1.00070]	3.441890 (2.37257) [1.45070]	10.37355 (6.53809) [1.58663]
R-squared	0.918798	0.490324	0.141355	0.186530
Adj. R-squared	0.910250	0.436674	0.050971	0.100901
Sum sq. resids	55556117	37.93979	465.8011	3537.244
S.E. equation	1209.133	0.999207	3.501132	9.648076
F-statistic	107.4921	9.139282	1.563940	2.178361
Log likelihood	-363.5560	-58.32256	-112.2394	-155.8273
Akaike AIC	17.14214	2.945235	5.452994	7.480338
Schwarz SC	17.34693	3.150026	5.657785	7.685129
Mean dependent	4233.664	1.056538	5.999030	11.72673
S.D. dependent	4036.061	1.331299	3.593923	10.17506

Determinant resid covariance (dof adj.)	2.18E+08
Determinant resid covariance	1.33E+08
Log likelihood	-646.2005
Akaike information criterion	30.98607
Schwarz criterion	31.80523

APPENDIX 4

Granger Causality Test

Pairwise Granger Causality Tests
Date: 04/22/15 Time: 16:01
Sample: 1970 2013
Lags: 1

Null Hypothesis:	Obs	F-Statistic	Prob.
INFL does not Granger Cause GDP	43	0.66153	0.4208
GDP does not Granger Cause INFL		0.70480	0.4062
EXCHRATE does not Granger Cause GDP	43	0.39101	0.5353
GDP does not Granger Cause EXCHRATE		0.96185	0.3326
FDI does not Granger Cause GDP	43	0.10059	0.7528
GDP does not Granger Cause FDI		4.86783	0.0332
EXCHRATE does not Granger Cause INFL	43	2.07365	0.1576
INFL does not Granger Cause EXCHRATE		4.86000	0.0333
FDI does not Granger Cause INFL	43	3.30375	0.0766
INFL does not Granger Cause FDI		1.68524	0.2017
FDI does not Granger Cause EXCHRATE	43	0.38336	0.5393
EXCHRATE does not Granger Cause FDI		0.04198	0.8387

APPENDIX 5

VAR Stability Test

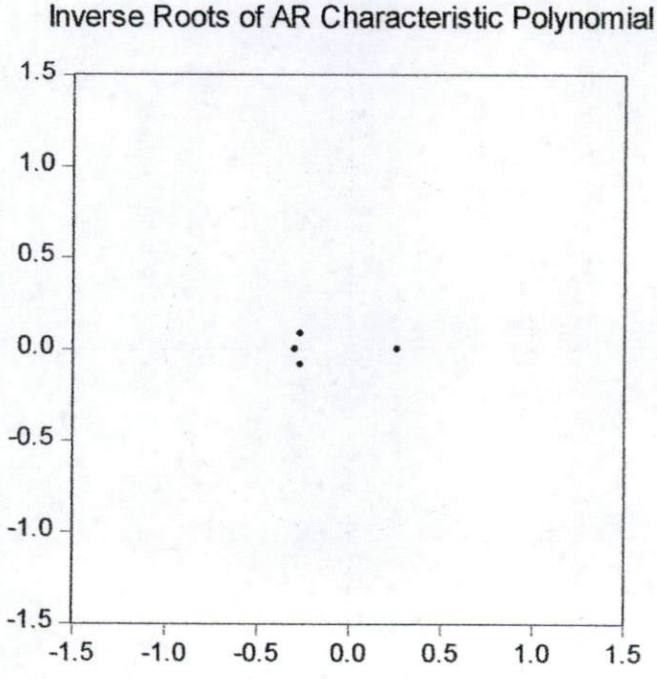
(Table)

Roots of Characteristic Polynomial
Endogenous variables: D(GDP) D(INFLATION) D(EXCHRATE) D(FDI)
Exogenous variables: C
Lag specification: 1 1
Date: 07/23/15 Time: 12:27

Root	Modulus
-0.297917	0.297917
-0.269741 - 0.083639i	0.282411
-0.269741 + 0.083639i	0.282411
0.260549	0.260549

No root lies outside the unit circle.
VAR satisfies the stability condition.

(Graph)



APPENDIX 6

VECM Stability Test

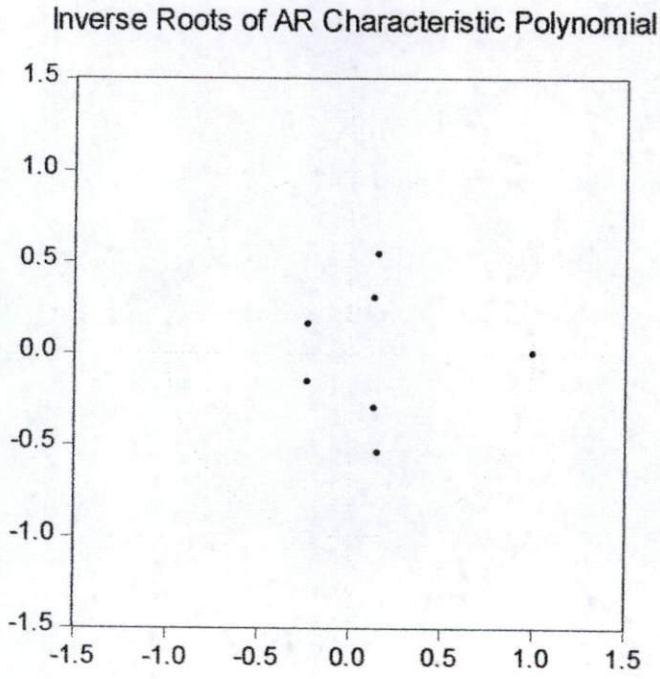
(table)

Roots of Characteristic Polynomial
Endogenous variables: GDP INFL EXCHRATE FDI
Exogenous variables:
Lag specification: 1 1
Date: 04/22/15 Time: 15:10

Root	Modulus
1.000000	1.000000
1.000000	1.000000
0.155667 - 0.543194i	0.565059
0.155667 + 0.543194i	0.565059
0.135845 - 0.300327i	0.329621
0.135845 + 0.300327i	0.329621
-0.231761 - 0.156496i	0.279650
-0.231761 + 0.156496i	0.279650

VEC specification imposes 2 unit root(s).

(graph)



APPENDIX 7

SVAR Estimation

Structural VAR Estimates
Date: 04/22/15 Time: 15:16
Sample (adjusted): 1971 2013
Included observations: 43 after adjustments
Estimation method: method of scoring (analytic derivatives)
Convergence achieved after 41 iterations
Structural VAR is just-identified

Model: Ae = Bu where E[uu']=I
Restriction Type: short-run text form
@e1 = C(1)*@u1
@e2 = C(2)*@e1 + C(3)*@u2
@e3 = C(4)*@e1 + C(5)*@e2 + C(6)*@u3
@e4 = C(7)*@e1 + C(8)*@e2 + C(9)*@e3 + C(10)*@u4
where
@e1 represents GDP residuals
@e2 represents INFL residuals
@e3 represents EXCHRATE residuals
@e4 represents FDI residuals

	Coefficient	Std. Error	z-Statistic	Prob.
C(2)	-1.534988	0.351604	-4.365678	0.0000
C(4)	-162.5107	34.41779	-4.721707	0.0000
C(5)	59.58249	12.42587	4.795037	0.0000
C(7)	0.000642	0.059705	0.010760	0.9914
C(8)	-0.012283	0.021670	-0.566792	0.5709
C(9)	-0.000197	0.000215	-0.917300	0.3590
C(1)	3.550364	0.382846	9.273618	0.0000
C(3)	8.185789	0.882696	9.273618	0.0000
C(6)	666.9932	71.92373	9.273618	0.0000
C(10)	0.938962	0.101251	9.273618	0.0000
Log likelihood	-665.8551			

Estimated A matrix:

1.000000	0.000000	0.000000	0.000000
1.534988	1.000000	0.000000	0.000000
162.5107	-59.58249	1.000000	0.000000
-0.000642	0.012283	0.000197	1.000000

Estimated B matrix:

3.550364	0.000000	0.000000	0.000000
0.000000	8.185789	0.000000	0.000000
0.000000	0.000000	666.9932	0.000000
0.000000	0.000000	0.000000	0.938962

APPENDIX 8

SVAR Stability Check

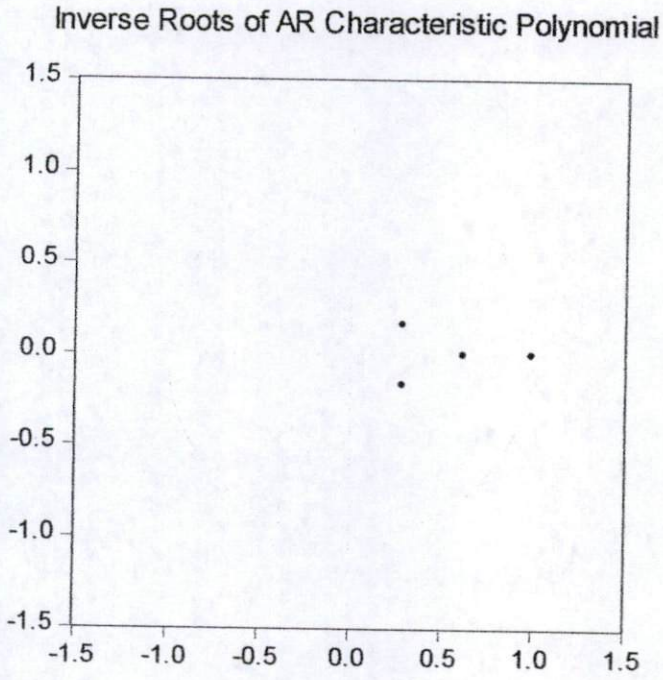
(Table)

Roots of Characteristic Polynomial
Endogenous variables: GDP INFL EXCHRATE FDI
Exogenous variables: C
Lag specification: 1 1
Date: 04/22/15 Time: 15:20

Root	Modulus
0.991395	0.991395
0.616504	0.616504
0.282698 - 0.165510i	0.327585
0.282698 + 0.165510i	0.327585

No root lies outside the unit circle.
VAR satisfies the stability condition.

(Graph)



APPENDIX 9

Residual Correlation Matriks

	GDP	INFL	EXCHRATE	FDI
GDP	1.000000	-0.648444	-0.828755	0.295246
INFL	-0.648444	1.000000	0.725981	-0.272715
EXCHRATE	-0.828755	0.725981	1.000000	-0.308585
FDI	0.295246	-0.272715	-0.308585	1.000000

APPENDIX 10

Impulse Response Function (IRF)

(Table)

Response of GDP: Period	GDP	INFL	EXCHRATE	FDI
1	3.501132	0.000000	0.000000	0.000000
	(0.37754)	(0.00000)	(0.00000)	(0.00000)
2	1.138609	0.328743	-0.021358	-0.169475
	(0.55722)	(0.52575)	(0.10906)	(0.41639)
3	0.342579	0.204221	-0.061899	-0.084973
	(0.38791)	(0.32551)	(0.11950)	(0.38226)
4	0.141831	0.097357	-0.081988	-0.021089
	(0.28544)	(0.15417)	(0.12343)	(0.27261)
5	0.110952	0.049522	-0.088502	0.004663
	(0.22816)	(0.08186)	(0.12715)	(0.18022)
6	0.113101	0.033414	-0.089567	0.011549
	(0.18761)	(0.06036)	(0.13030)	(0.11956)
7	0.116231	0.029064	-0.089027	0.012156
	(0.16751)	(0.05455)	(0.13303)	(0.08430)
8	0.116704	0.028052	-0.088180	0.011420
	(0.16282)	(0.05283)	(0.13552)	(0.06498)
9	0.115774	0.027724	-0.087340	0.010713
	(0.16483)	(0.05230)	(0.13783)	(0.05443)
10	0.114467	0.027463	-0.086545	0.010235
	(0.16863)	(0.05221)	(0.14004)	(0.04844)

Response of INFL: Period	GDP	INFL	EXCHRATE	FDI
1	-6.256235	7.344719	0.000000	0.000000
	(1.30754)	(0.79200)	(0.00000)	(0.00000)
2	-1.397742	1.522381	-0.474255	1.857319
	(1.54312)	(1.48216)	(0.40994)	(1.16371)
3	0.859430	0.344913	-0.433062	1.509037
	(0.99573)	(0.81440)	(0.38175)	(0.96644)

4	1.307887	0.216076	-0.348046	0.942689
	(0.76915)	(0.41992)	(0.33084)	(0.63929)
5	1.129753	0.215251	-0.297269	0.554923
	(0.64705)	(0.34954)	(0.30690)	(0.44664)
6	0.863517	0.194970	-0.272841	0.331718
	(0.53696)	(0.30019)	(0.29781)	(0.35862)
7	0.659148	0.162713	-0.261050	0.207169
	(0.46942)	(0.24423)	(0.29475)	(0.30488)
8	0.526613	0.133640	-0.254451	0.136016
	(0.43638)	(0.20093)	(0.29407)	(0.25966)
9	0.444952	0.112506	-0.249976	0.093884
	(0.41905)	(0.17323)	(0.29429)	(0.22103)
10	0.394770	0.098510	-0.246483	0.068237
	(0.40847)	(0.15662)	(0.29486)	(0.19032)

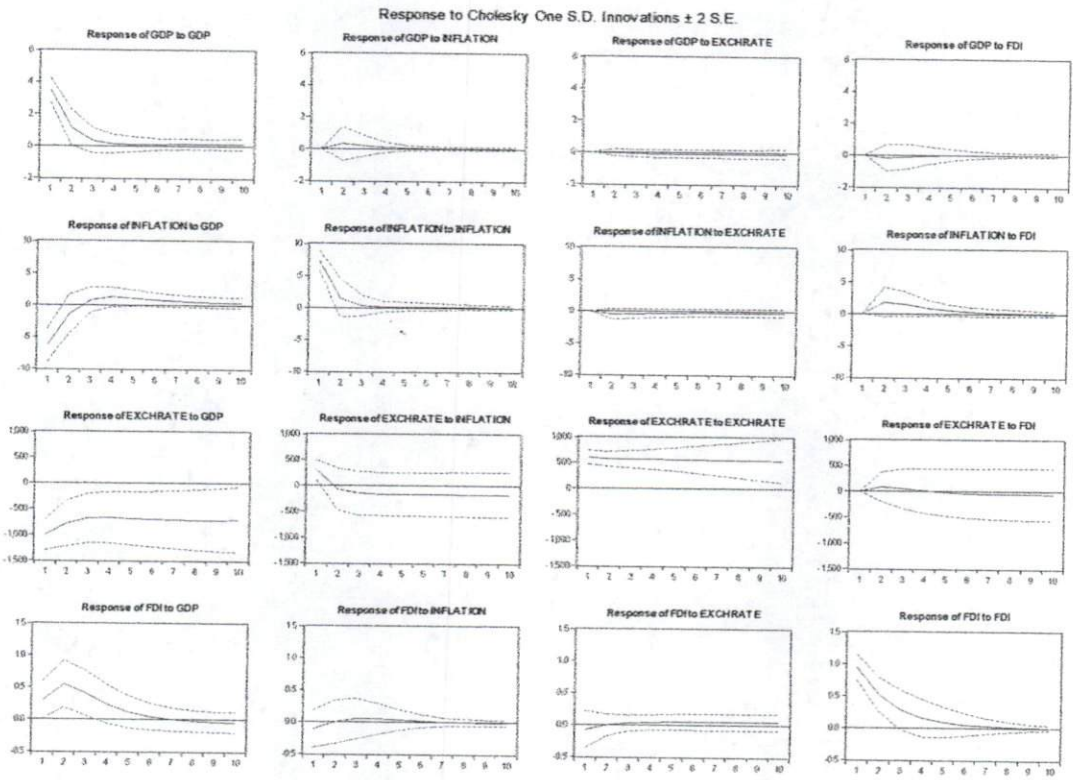
Response of EXCHRATE: Period	GDP	INFL	EXCHRATE	FDI
1	-1002.075	299.5261	606.7399	0.000000
	(149.412)	(98.0023)	(65.4264)	(0.00000)
2	-784.6661	-68.31913	573.0644	86.68597
	(223.459)	(201.504)	(73.0189)	(143.969)
3	-681.4711	-150.6120	570.5673	51.02345
	(240.713)	(214.375)	(84.1268)	(195.954)
4	-668.4715	-164.1547	570.8766	7.604148
	(248.445)	(208.878)	(98.0069)	(218.094)
5	-684.4393	-166.6618	569.1405	-21.60686
	(258.225)	(207.725)	(114.578)	(230.371)
6	-701.0930	-168.5788	565.7788	-38.58424
	(269.252)	(210.265)	(132.977)	(239.150)
7	-711.3302	-170.2837	561.6226	-48.09412
	(280.825)	(213.463)	(152.521)	(245.785)
8	-715.5987	-171.2796	557.1417	-53.41621
	(292.736)	(215.849)	(172.737)	(250.383)
9	-715.7944	-171.4976	552.5402	-56.38462
	(305.128)	(217.227)	(193.302)	(253.073)
10	-713.4842	-171.1083	547.9000	-57.98727
	(318.265)	(217.865)	(214.001)	(254.167)

Response of FDI: Period	GDP	INFL	EXCHRATE	FDI
1	0.295012	-0.106665	-0.074582	0.945750
	(0.14902)	(0.14513)	(0.14445)	(0.10198)
2	0.555210	0.000259	-0.003419	0.526093
	(0.18391)	(0.16969)	(0.08574)	(0.13158)
3	0.410792	0.050205	0.028437	0.284749
	(0.17712)	(0.15867)	(0.06253)	(0.15702)
4	0.238350	0.048901	0.040571	0.158120
	(0.15137)	(0.11974)	(0.05927)	(0.14759)
5	0.117709	0.031694	0.045009	0.090728
	(0.12560)	(0.07962)	(0.06144)	(0.11980)
6	0.044299	0.015282	0.046741	0.052847
	(0.10500)	(0.05037)	(0.06377)	(0.08841)
7	0.001239	0.003671	0.047480	0.030431

	(0.09065)	(0.03309)	(0.06519)	(0.06096)
8	-0.024055	-0.003681	0.047772	0.016758
	(0.08293)	(0.02517)	(0.06568)	(0.04000)
9	-0.039063	-0.008136	0.047808	0.008320
	(0.08048)	(0.02306)	(0.06550)	(0.02594)
10	-0.048007	-0.010791	0.047681	0.003108
	(0.08086)	(0.02345)	(0.06486)	(0.01864)

Cholesky Ordering: GDP INFL EXCHRATE FDI
Standard Errors: Analytic

(Graph)



APPENDIX 11

Forecast Error Variance Decomposition

Variance Decomposition of GDP: Period	S.E.	GDP	INFL	EXCHRATE	FDI
1	3.501132	100.0000	0.000000	0.000000	0.000000
2	3.700217	98.99756	0.789331	0.003332	0.209775
3	3.723133	98.62926	1.080516	0.030932	0.259290
4	3.728067	98.51313	1.145855	0.079215	0.261804
5	3.731099	98.44150	1.161610	0.135351	0.261535
6	3.734055	98.37747	1.167779	0.192671	0.262077
7	3.737057	98.31622	1.171952	0.249115	0.262715
8	3.740041	98.25676	1.175709	0.304306	0.263228
9	3.742970	98.19873	1.179356	0.358279	0.263635
10	3.745834	98.14198	1.182928	0.411113	0.263979

Variance Decomposition of INFL: Period	S.E.	GDP	INFL	EXCHRATE	FDI
1	9.648076	42.04794	57.95206	0.000000	0.000000
2	10.05143	40.67471	55.68825	0.222622	3.414421
3	10.21536	40.08754	54.02930	0.395254	5.487905
4	10.34991	40.64889	52.67724	0.498128	6.175736
5	10.43262	41.17958	51.88784	0.571452	6.361128
6	10.47892	41.49557	51.46497	0.634207	6.405251
7	10.50618	41.67414	51.22226	0.692659	6.410941
8	10.52417	41.78214	51.06337	0.748749	6.405740
9	10.53756	41.85435	50.94511	0.803123	6.397413
10	10.54851	41.90753	50.84809	0.856056	6.388319

Variance Decomposition of EXCHRATE: Period	S.E.	GDP	INFL	EXCHRATE	FDI
1	1209.133	68.68343	6.136505	25.18006	0.000000
2	1555.085	66.98351	3.902900	28.80285	0.310735
3	1798.201	64.45774	3.620424	31.60894	0.312905
4	2008.304	62.75559	3.570641	33.42148	0.252292
5	2203.158	61.79701	3.539218	34.44451	0.219257
6	2386.514	61.29630	3.515246	34.97546	0.212999
7	2558.939	61.04134	3.500301	35.23778	0.220586
8	2720.818	60.91131	3.492471	35.36255	0.233662
9	2872.821	60.84420	3.489037	35.41865	0.248111